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R E P O R T S
FROM
COMMISSIONERS, INSPECTORS,
AND OTHERS:
THIRTY-ONE VOLUMES.

—(4.)—

NAVY (ENGINEERS);
NAVY (ROYAL MARINES); NAVAL CADETS COLLEGE SITE;
ROYAL NAVAL COLLEGE (GREENWICH).

Session
8 February — 14 August 1877.

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REPORTS

FROM

COMMISSIONERS, INSPECTORS,

AND OTHERS:

1877.

THIRTY-ONE VOLUMES:—CONTENTS OF THE FOURTH VOLUME.

N.B.—*THE* Figures at the beginning of the line, correspond with the N° at the foot of each Report; and the Figures at the end of the line, refer to the MS. Paging of the Volumes arranged for The House of Commons.

NAVY (ENGINEERS):

- [c. 1647.] Report of the Committee appointed to consider the best means of securing the Highest Mechanical Skill and Scientific Knowledge in the Management of the various Engines of Her Majesty's Ships of War, and the Supply of Engineer Officers and Engine Room Artificers for Her Majesty's Navy - - - p. 1

NAVY (ROYAL MARINES):

422. Report of a Departmental Committee appointed to report upon Promotion and Retirement in the Corps of the Royal Marines, 347

NAVAL CADETS COLLEGE SITE:

- [c. 1673.] Report of the Committee appointed to Advise as to the most desirable Site for a College for Naval Cadets - - - 395

ROYAL NAVAL COLLEGE (GREENWICH):

- [c. 1672.] First Annual Report on the Royal Naval College - - 407
- [c. 1733.] Report of the Committee appointed to inquire into the Establishment of the Royal Naval College, Greenwich, with Minutes of Evidence, Appendix, and Index - - - 415
-

REPORT OF THE COMMITTEE

APPOINTED BY

THE LORDS COMMISSIONERS OF THE ADMIRALTY

TO

Consider the Best Means of Securing the Highest Mechanical Skill and Scientific
Knowledge in the Management of the various Engines

OF

HER MAJESTY'S SHIPS OF WAR,

AND THE

Supply of Engineer Officers and Engine Room Artificers for Her Majesty's Navy.

Presented to both Houses of Parliament by Command of Her Majesty.
1877.

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Letter forwarded by the Secretary of the Admiralty to the Chairman of the Committee.

ADMIRALTY,

16th September, 1875.

SIR,

I AM commanded by my Lords Commissioners of the Admiralty, to acquaint you that they propose to appoint a Committee, to consist of yourself and the Officers named in the margin, to consider "How the most scientific and practical management of engines, and the highest mechanical skill for their maintenance, can best be secured for Her Majesty's Navy."

It is proposed that the Committee should meet at the Admiralty as soon as practicable after the middle of September. Should they wish to adjourn to Portsmouth or elsewhere, they are at liberty to apply for sanction to do so.

I am,

SIR,

Your obedient Servant,

(Signed) VERNON LUSHINGTON.

Vice Admiral Sir A. Cooper Key, K.C.B.

Extract from Letter forwarded by the Secretary of the Admiralty to each Member of the Committee.

ADMIRALTY,

7th September, 1875.

SIR,

I AM commanded by my Lords Commissioners of the Admiralty to acquaint you that they propose to nominate a Committee to consider the question of the supply of Engineer Officers and Engine Room Artificers for Her Majesty's Ships, and I am to request you to sit on the Committee in question.

I am,

SIR,

Your obedient Servant,

(Signed) VERNON LUSHINGTON.

NOTE.—Mr. Covey, Chief Inspector of Machinery Afloat, Devonport, was added to the Committee, in October, 1875, Mr. Oliver being absent on special duty.

Captain William M. Dowell, C.B.
Captain Sir John E. Commerell, K.C.B.
Mr. Wright, Engineer-in-Chief, Admiralty.
Mr. Oliver, Chief Inspector of Machinery Afloat, Portsmouth.

REPORT.

1. In pursuance of instructions from the Lords Commissioners of the Admiralty, we, the members of the Committee appointed to consider the best means of securing for Her Majesty's Navy the highest mechanical skill and scientific knowledge in the management of the various engines in ships of war, have carefully examined the Regulations and Instructions, which have been issued from time to time by their Lordships, respecting the supply of Engineer Officers and Engine Room Artificers, and all points connected with their training and position afloat.

2. We have taken the evidence of 68 witnesses on the subject, including Officers of various ranks in Her Majesty's Navy, the General Inspector of Engineering Works of the United States Navy, and Gentlemen connected with large steam ship companies.

3. We have visited the Dockyards of Portsmouth and Devonport, examining witnesses at those ports and inspecting the factories.

4. Thus we have been enabled to arrive at definite conclusions on those points to which our attention has been directed, and now submit them for the consideration of their Lordships.

5. We have entered on this enquiry with a full sense of the importance of the subject. No arguments are needed to prove that the efficiency of our fleets, on which the strength and security of this country must ever depend, is becoming daily more intimately connected with the care and management of the steam machinery in ships of war. The power of that machinery has increased in amount since the year 1855, from 155,000 indicated horse power, to 458,000 indicated horse power in 1875. This represents the motive power only of the ships of the fleet, in addition to which the ironclads and other large vessels of the present day, carry numerous engines for duties which, in former days, were performed entirely by manual labour. Indeed, a ship of war, with her powerful engines for propulsion, elaborate machinery for the steering gear and capstans, her guns and gun carriages, and all her interior fittings connected with the various compartments, pumps, pipes, and valves, forms one large and complicated machine.

6. The source from whence Officers of that branch of the Service are obtained, who will, under the Officer in command of the ship, be responsible for the care and management of the steam machinery, the mode of training them in a knowledge of their duties, and the position they will occupy in the Fleet, are subjects worthy of much consideration.

7. The Regulations established by their Lordships in 1863, for the practical and theoretical instruction of the Engineer Officers of the Royal Navy, with the exception of some points of minor importance, to which reference will be made, are, in the opinion of the Committee, well suited to the object in view. Extracts from these Regulations, and others bearing on the subject of our enquiry, are appended to this Report. (Appendices III., IV., V., VI., and VII.)

8. The examination on entry, the six years' practical training in the workshops and steam ships at the dockyards, combined with a certain amount of theoretical instruction in the schools, the subsequent nine months' study at the Royal Naval College, and the selection of two Officers annually for a higher course of education, complete a system of training, which, if carefully carried out in all its details, will furnish the Naval Service with a well educated body of Engineers, from which Officers can be selected to fill any position requiring engineering knowledge and mechanical skill.

9. We are met, however, on the outset of the enquiry, by a defect of much importance, a defect which is recognised by nearly all the witnesses we have examined, and to which they bear decided testimony. It is that, notwithstanding the high education to be given, and the position in which the Engineer Officers will be placed on board Ship as Commissioned Officers, a large portion of the Candidates for entry as Engineer Students are sons of artificers of various grades in the dockyards, of seamen and marines, or of others belonging to the same class of society.

10. As it is undoubtedly desirable that Officers should be highly educated to perform the duties of Naval Engineers, and hold the rank of Commissioned Officers, it is equally desirable that they should be in all respects fitted to take their place with Officers of corresponding rank in wardroom or gunroom messes. This evidently cannot be the case with the majority of the Students lately entered.

11. As remedies for this defect, we recommend : 1st, that in the admission of Candidates to compete, more searching enquiries be made of the referees named by the parents (in accordance with the existing regulations), to ensure that the Candidates are in all respects eligible for their future position in Her Majesty's Service. 2nd, that the Students should pay a certain sum to defray in part the expense of their education, as is the case in other branches of the Service, and the custom in every other inlet to the profession of Engineer.

12. If such means are adopted, and if the measures we shall hereafter recommend for the improvement in the pay and promotion of the Engineering Branch of the Service be carried out, it may be expected that a larger proportion of the sons of professional men will be induced to enter as Students. We have received evidence that the indiscriminate admission of lads from the lower ranks of society deters Officers, and other professional men from allowing their sons to compete for these appointments, although they readily seek admission for them to other branches of the Engineering profession. Further, if the regulations for the entry of Engineer Students, and the prospects of the Engineering Branch of the Navy were made known throughout the country, Candidates would probably be forthcoming from inland and northern counties, instead of being restricted, as at present, to the locality of the naval ports.

13. We have prefaced the detailed portion of our Report with the foregoing remarks, as we consider that the point there referred to is one of much importance to the welfare of the Service, and to the full success of any suggestions we may now offer.

Entry and Training of Engineer Students.

14. We recommend that all applications for permission to compete for entry shall be sent to the Admiralty by the 1st April in each year, accompanied by the certificates and references now required by the Regulations.

15. It appears desirable to extend the age for examination one year, making the limits between 14 and 16 years of age, instead of as at present between 14 and 15. The additional year will give some Candidates a chance of a second trial, and will yet admit those who have most ability at the earlier age.

16. The examination now commences on the first Tuesday in June in each year. The results are not communicated to the Candidates until August, the Students entering Her Majesty's Naval Service in the following September.

17. We recommend that the examination should be held in London only by the Civil Service Commissioners, commencing on the first Tuesday in May in each year.

18. The subjects of examination to be the following :—

						Marks.
English—						
* Writing from dictation	..	..	..	..	..	75
* Reading and parsing	..	..	..	..	..	75
* Composition	..	..	..	..	..	100
Grammar	..	..	..	..	..	150
						<hr/> 400
French—						
Translation into English	..	..	..	..	..	50
Grammar	..	..	..	..	..	100
						<hr/> 150
Geography	..	..	..	..	..	100
* Arithmetic	..	..	..	..	..	250
Algebra (up to and including quadratic equations)	..	..	..	..	..	300
Geometry (the subjects of the first six books of Euclid's elements)	..	..	..	..	..	300
						<hr/> 1,500

* No Candidate will be allowed to compete who fails to satisfy the Examiners in these subjects.

19. The successful Candidates should be bound by Indentures, in accordance with recent regulations, and entered at the Dockyards on 1st July.

20. They should receive weekly wages, as at present, on a graduated scale, be under the same rules as regards punishments for absence or misconduct, and should pay £25 a-year each, during the first three years of their service.

21. The period now allotted to the practical training of the Students during the six years of their apprenticeship, the proportion of that time appropriated to work in the Schools,

and the distribution of the remaining portion in the various shops and departments of the Dockyards, appear to the Committee to be well adapted to the object in view, and much benefit has resulted from the Instructions issued in May 1873, which direct that a Leading Man shall superintend the Students while they are engaged in the various shops, and which require that the examination of the Students as to their ability as workmen shall be conducted by the Officers of the Steam Reserve, in conjunction with the Chief Engineer of the Yard, and a Chief Engineer of the Fleet.

22. The Committee are, however, of opinion that more supervision and instruction should be afforded to the Students while at their practical work, and especially while employed on iron ships under construction. One Leading Man at each Dockyard is insufficient for so large a number of Students. Any additional expense that may be incurred by affording increased means of instruction will be met by the payment which has been recommended should be made by each Student towards the cost of his education.

23. We also consider it very desirable that during the fifth and sixth years of the Students' service in the Yards, they should receive instruction by lectures or otherwise, on the marine steam engine and boilers, on one afternoon in each week, and to this should be added some means of enabling them to judge of the qualities of different kinds of coal, by inspection and experiment, to determine their relative values for the production of steam.

24. In order that every encouragement should be given to the Students to become good practical workmen, so as to be able skilfully to superintend and effectively carry out any needful repairs to the engines or boilers of H. M. Ships, we recommend that carefully considered annual reports should be made to the Admiralty, respecting their work in the shops, and that the result of their final examination to ascertain their ability as workmen should be classified as "very creditable," "creditabile," and "ordinary," and recorded on the printed annual report of the educational examination which is circulated at the Dockyards.

25. As an additional inducement to the Students to improve their skill as workmen, we recommend that two prizes be given annually at each Yard, the first of the value of £2, the second of £1, to those who are most highly reported on in that respect.

26. Arrangements should be made for the examinations, both educational and practical, to take place earlier than at present, in order that the result may be known by the 1st July in each year.

27. During the period of service of the Students at the Dockyards, we consider it of importance that in matters connected with their manual work as artificers in the various shops they should be treated in all respects as other workmen in the Yard; but in order that some distinction should be made with regard to those who will shortly take rank as Officers in Her Majesty's Service, we recommend that the Students should be exempted from search by the police on leaving the Yard, that they should not take up and leave tickets on entering to begin work and on leaving, but should sign their names in a book. Convenient accommodation should also be afforded them for washing, changing their clothes, &c., and taking their tea in the interval between the conclusion of their work and their attendance at evening school.

28. Before leaving this part of the subject of our enquiry, we think it right to call attention to the great benefits that both the Students and the Service would derive from the establishment of a residence for the Students in the Yard, either afloat or on shore, where they would be under the supervision of Naval Engineers of the Reserve, and would become accustomed to the discipline, which in many cases they find irksome on first appointment to a ship of war. We consider that such an arrangement would encourage parents who live at a distance from the sea ports to send their sons up as Candidates for Engineer Studentships, who otherwise would be prevented from doing so by the fear of the unprotected life they would lead when off duty at the Dockyard.

Assistant-Engineers under Training.

29. The Students who, having completed their period of service in the Yard, pass satisfactorily in both practical and theoretical subjects, should be appointed to the Reserves as Acting Assistant Engineers, and on the following October 1st join the Royal Naval College for a course of study in accordance with the existing Regulations, being placed in the Navy List as "on probation."

30. Having completed their course, as established from time to time by the Board of Admiralty, they should be examined in the subjects they have studied, and be dealt with as follows:—

31. Those who take first and second places at this examination should, provided they reach the standard of a 1st Class Certificate, and have previously passed a "creditable" examination as workmen, be allowed the option of remaining at the College for further study during two sessions of nine months each.

32. Those who obtain 1st Class Certificates, should receive Commissions dated the same day as their acting appointments. Those who obtain 2nd Class Certificates, should receive Commissions dated six months after the date of their acting appointments, and those who obtain 3rd Class Certificates, should receive Commissions dated the day after their discharge from the Royal Naval College. The additional time given for 1st Class Certificates and 2nd Class Certificates, to reckon in all respects as time served as Assistant Engineers.

33. All who obtain Certificates should be placed in the Navy List in the order in which they pass the final examination.

34. The pay of Acting Assistant Engineers, during the period of study at the College, should be as now, 6s. a-day, and they should be allowed 1s. 6d. a-day towards their mess expenses.

35. We recommend that all Engineer Officers now holding, or who may in future obtain, 1st Class Professional Certificates from the Royal Naval College, and Officers who have taken the first place in each year amongst those who now hold, or may in future obtain, 2nd Class Professional Certificates, should be advanced to the rank of Chief Engineer after 10 and 13 years' service respectively. These promotions should in all cases depend on the Officers having conducted themselves satisfactorily in every respect, and proved themselves thoroughly efficient in the performance of their duties. The above regulation should also apply to Engineer Officers who hold Diplomas of the 1st Class, and those who obtained the first place in each year amongst the 2nd Class Fellows of the Royal School of Naval Architecture.

36. We think it desirable not to confine the entry of Assistant Engineers entirely to the Students who have been trained in the Dockyards, and suggest that a limited number of young men who have received their education in private engineering firms, be entered between the ages of 21 and 25, provided they pass the same examination, in all respects, as the Engineer Students who have completed their time at the Dockyards. After their entry they should undergo the same course of study at the Royal Naval College, and receive the same pay and allowances as the Assistant Engineers who have been trained as Engineer Students.

Engineer Officers.

Present Prospects and Number required.

37. The Committee have thus far only considered the system of training the Engineer Students and the Assistant Engineers on their first appointment, and have recommended some modifications of the present Regulations, with the view of ensuring a high standard of scientific knowledge and mechanical skill in the Officers who fill so important a position in Her Majesty's Fleet.

38. They now proceed to consider whether the career which appears to be open to those Officers after they join the Service—as regards their prospects of promotion, pay, and retiring allowances—is such as to induce well-qualified Candidates to offer themselves for entry, and undergo the course of training and study necessary to fit them for the duties they will be required to perform.

39. The scale of full pay of Engineers and Assistant Engineers is at present as follows:—

					One Day.	One Year of 365 Days.
					£ s. d.	£ s. d.
2nd Class Assistant Engineer	..	..	..		0 6 0	109 10 0
1st Class Assistant Engineer	..	..	..		0 7 6	136 17 6
Engineer	..	..	..	..	0 9 0	164 5 0
Ditto, after 5 years' service	..	..	..		0 10 0	182 10 0

40. 1st and 2nd Class Assistant Engineers generally serve for six years before they reach the rank of Engineer, which rank they attain at about the age of 27.

41. The term of service as Engineer before promotion is now about 13 years ; very few, therefore, reach the rank of Chief Engineer before the age of 40 years, the average age of the 21 Senior Engineers on the list eligible for promotion being now about 41 years.

42. The age and length of service at which an Engineer obtains his promotion to Chief Engineer is increasing every year. In 1866 the period of service from entry until the rank of Chief Engineer was reached was about 12 years, it is now about $19\frac{3}{4}$ years, and during the last 8 years of this period he has received the maximum pay of his rank, which is 10s. a-day.

43. Officers holding the rank of Engineer, who are qualified for promotion, are allowed to retire on a pension at the age of 50, at the rate of £6 for every year of service. Engineers who are not qualified for promotion may retire on the same terms at the age of 45. The maximum pension allowed in both cases is £130 per annum.

44. The Committee are of opinion that in consideration of the important nature of their duties, the age at which promotion is obtained in other branches of the Service, the high educational standard now required, and the actual marketable value of the knowledge and skill the Engineer Officers possess, their prospects of promotion and the amount of pay they receive are insufficient.

45. There are at present 170 Chief Engineers and 735 Engineers and Assistant Engineers on the active list of the Navy. So long as this proportion is continued the evils of slow promotion must exist, unless an extensive and costly scheme of retirement be carried out, which we are unwilling to suggest.

46. We think it desirable that the number of Chief Engineers should be increased, and in consideration of the greater indicated horse power now developed by the engines of the smaller vessels, as well as to prevent the serious inconvenience of retaining a large number on half-pay, we recommend that Chief Engineers should be appointed to every ship commanded by a Commander. This would raise the number of Chief Engineers from 170 to about 220, which will provide a sufficient number for the present requirements of the Service.

47. We are further of opinion that the number of Engineer Officers in each ship might be advantageously reduced, and the places they now occupy filled by Engine Room Artificers. In this opinion we are supported by the testimony of a large proportion of the witnesses we have examined on the subject.

48. The number of Officers in the Engine Room of a large ship is out of proportion to the number of men under their control ; this is, in a great measure, in consequence of their being required to carry out repairs to the engines and boilers. The Committee are very desirous to ensure that every Engineer Officer in the Service shall possess in a high degree the mechanical skill necessary for superintending any ordinary or extraordinary repairs, and when required of performing them himself, but it appears undesirable to train and educate a large body of Officers for the purpose of doing work which can be as efficiently and more rapidly done by artificers, more especially as artificers can be obtained who are skilled in the knowledge of the various special trades necessary for the repairs of engines and boilers, with several of which trades the Engineer Officers can necessarily be but imperfectly acquainted, such as that of the boiler maker, smith, and coppersmith.

49. We have carefully considered this point as bearing in an important degree on the object of our enquiry, and have appended to this Report a table (Appendix II.), which shows the number of Engineer Officers and Engine Room Artificers we consider necessary for each class of ship. Taking the "Sultan" as a type of the largest class, which bears now 1 Chief Engineer, 9 Engineers and Assistants, and 4 Engine Room Artificers, we recommend that she should bear 1 Chief Engineer, 5 Engineers and Assistants, and 8 Engine Room Artificers ; in other ships the numbers are altered in about the same proportion. Some modifications are necessary in ships like the "Inflexible" with two distinct Engine Rooms. In all ships having engines of 2,500 indicated horse power and upwards there would be Engineers enough to have one always on watch in the Engine Room.

50. The table to which reference has been made shows that the numbers required to complete the complements of all ships fit for Service, including those for Home Service, and also of ships in an advanced state of building, in accordance with the scale we have suggested, are :—

Chief Engineers.	Engineers and Assistant Engineers.	Engine Room Artificers.
232	694	835

51. If the number in each class were completed to the amount here indicated, a large proportion of them must necessarily be unemployed, which is in all respects undesirable ;

therefore, although we are of opinion that Chief Engineers and Engineers should be borne in sufficient numbers, nearly to meet our requirements at the outbreak of a war, as Officers with the necessary qualifications could not then be readily obtained, we propose that the number in each rank should be limited during peace time to the following :—

Chief Engineers.	Engineers and Assistant Engineers.	Engine Room Artificers.
220	600	450

During war the number of Engineer Officers on leave, on half-pay, and in the dockyards would be less than at present.

52. The proportion of Engineer Officers and Engine Room Artificers we have suggested for each ship should be modified, so as to furnish employment for them afloat : the number of Engineer Officers must be somewhat more, and that of the Engine Room Artificers somewhat less than is shown in Table 2, Appendix II.

53. As we do not apprehend any difficulty in procuring Engine Room Artificers at the present time, or serious difficulty at the outbreak of a war, the numbers entered might be limited to the actual requirements of the Service.

54. The number in each class now borne for active service is :—

Chief Engineers.	Engineers and Assistant Engineers.	Engine Room Artificers.
170	735	290

55. The measures which we shall propose will enable their Lordships to make the necessary changes in the number of each class, either gradually or immediately, as may be found most beneficial for the Service. Those measures will consist of—

1. An increase in the number of Chief Engineers, as already mentioned.
2. An improved scale of retirement for Chief Engineers.
3. An improved scale of retirement for Engineers.
4. A progressive increase in the pay of Engine Room Artificers, and other advantages for that class.

Assistant Engineers.

56. The Committee consider that the rank of Assistant Engineer of the 2nd Class is unnecessary, and should not be retained, but that the two classes should be merged into one, and the whole termed Assistant Engineers ; after 4 years' service they should be allowed to pass for the rank of Engineer, and five years' service should render them eligible for promotion.

57. If the number of Engineers in each ship be reduced in accordance with our suggestions, it will then be necessary to afford opportunities for the Junior Assistant Engineers to become practically acquainted with the management of engines more immediately after their first entry into the Service than is the case at present, in order that they may be sooner fitted to take charge of a watch in the Engine Room of large ships. With this object we recommend that on their leaving the College on 30th June of each year, they should be appointed to Troop and Store ships, and to the Indian troop ships, in addition to the complement, for six months or longer, and keep watch in the Engine Room and stokehold under the superintendence of the Engineer on duty.

Pay of Assistant Engineers and Engineers.

58. The following table shows the scale of full and half pay, which we recommend for Engineers and Assistant Engineers :—

FULL PAY.					Year of 365 Days		One Day.	
					£	s. d.	£	s. d.
Assistant Engineers, under 1 year's service	..			..	109	10 0	..	0 6 0
" over "	..			..	136	17 6	..	0 7 6
Engineers .. .. .	..			..	164	5 0	..	0 9 0
" over 3 years' service	..			..	182	10 0	..	0 10 0
" 6 "	..			..	200	15 0	..	0 11 0
" 9 "	..			..	219	0 0	..	0 12 0

HALF-PAY.

				Year of 365 Days			One Day.		
				£	s.	d.	£	s.	d.
Assistant Engineers	..	..	..	82	2	6	..	0	4 6
Engineers	..	..	..	100	7	6	..	0	5 6
Ditto, after 3 years' service	..	..	..	109	10	0	..	0	6 0

Retirement of Engineers and Assistant Engineers.

59. When the number of Chief Engineers has been completed by promotions from the Engineers' List, there will yet remain more on that list than are required; and as by the existing regulations no means are available for reducing the number, seeing that the Engineers qualified for promotion cannot retire till the age of 50, and those not qualified until the age of 45, we recommend the following regulations for the retirement of Officers holding the rank of Engineer and Assistant Engineer.

60. Engineers to be retired at the age of 45 years, or at any age if they have not served on full pay for 3 years, or if physically unfit for service; to have the option of retiring at the age of 40 years, at the discretion of their Lordships, if their services are not required.

61. The amount of retired pay for Engineers qualified for promotion to the rank of Chief Engineer, to be £7 10s. per annum for each year's service on full pay since the date of confirmation as Assistant Engineer—half that amount for each year on half pay; the maximum amount to be £170 a year. For Engineers not qualified, £7 per annum for each year's service on full pay, since the date of confirmation as Assistant Engineer—half that amount for each year on half pay; the maximum amount to be £150 a year.

62. Engineers with a total service of 20 years on full pay, may be retired with the rank of Chief Engineer, if they are qualified for promotion, and have served creditably.

63. Assistant Engineers to be retired at 40 years of age; or at any age if they have not served on full pay for three years, or if physically unfit for service. The amount of their retired pay to be £20 per annum under 3 years' service, £25 per annum after 3 years' service, and £5 per annum for each additional year's service on full pay—half that amount for each year on half-pay—until a maximum of £50 per annum is reached.

Messing of Engineer Officers.

64. It cannot be questioned that much advantage would accrue to the Service if the Engineers' Mess could be at once abolished, the senior members of it being transferred to the Wardroom Mess, and the juniors to the Gunroom Mess. We have stated our opinion in the early part of this report, that such transfer cannot be made at once, but we must express a hope that when the number in each ship is reduced, and candidates for entry offer themselves from a higher class of society than at present, their Lordships may see fit in a very few years to carry out this desirable object. We are convinced that such a change would prove the greatest inducement that could be held out to members of the various professions to educate their sons for this branch of the Service, which is becoming daily of more importance, and for which thoroughly well qualified men are required.

65. The system of admitting Chief Engineers and Engineers "in charge" to the Wardroom has proved so beneficial, that we recommend an extension of that system at once, by allowing Engineers of 8 years' standing in that rank to mess in the Wardroom if they desire it, provided that not more than two in each ship are permitted to avail themselves of this privilege.

Cabin Accommodation.

66. We also urgently recommend that a cabin should be provided wherever it is practicable for the two senior Engineers to sleep in. These Officers will be about 35 years of age, and although we are aware of the great difficulty which exists in many ships with regard to cabin accommodation, we are of opinion that the Service would benefit by such an arrangement.

Chief Engineers.

67. The Committee have already suggested that the number of Chief Engineers should be increased in order that Officers of that rank should be appointed to all vessels commanded by Commanders. This would raise the number to about 220, and combined with our other recommendations, will probably reduce the average age of promotion to the rank of Chief Engineer from 42 to between 37 and 40.

68. This is still a high average age for promotion to a rank equal to that which is reached much earlier in other branches of the Service, and we are of opinion that some improvement in the pay of the Chief Engineers during the earlier years of their service in that rank is desirable, as many will still be compelled to retire, as at present, before they reach the maximum pay to which they would be entitled if promoted at an earlier age.

Full and Half-Pay.

69. The Committee, although wishing to propose more regularly progressive scales of full and half-pay based entirely on service as Chief Engineer, have found it necessary to suggest the continuance of the existing system of allowing junior service to be reckoned, as follows :—

Under 5 years' service in Senior Rank, 2 years' Junior Service besides.	
" 8 " " 4 "	
" 11 " " 6 "	
Above 11 " " All Junior Service which is allowed to count.	

70. The Committee recommend the following scales of full and half-pay for Chief Engineers, and that all confirmed time served in the junior ranks from the age of 20 be allowed to reckon for Junior Service in the proportions specified above.

FULL PAY.

		Year of 365 Days.				One Day.		
		£	s.	d.		£	s.	d.
Under 5 years' service (including Junior Service allowed)	..	255	10	0	..	0	14	0
" 8 " " " "	..	273	15	0	..	0	15	0
" 11 " " " "	..	292	0	0	..	0	16	0
" 14 " " " "	..	310	5	0	..	0	17	0
" 17 " " " "	..	328	10	0	..	0	18	0
" 20 " " " "	..	346	15	0	..	0	19	0
Above 20 " " " "	..	365	0	0	..	1	0	0
And for each additional year of service 1s. a-day more until the maximum is reached, namely	.. .. ..	401	10	0	..	1	2	0

HALF-PAY.

		Year of 365 Days				One Day.		
		£	s.	d.		£	s.	d.
Under 5 years' service (including Junior Service allowed)	..	136	17	6	..	0	7	6
" 8 " " " "	..	146	0	0	..	0	8	0
" 11 " " " "	..	164	5	0	..	0	9	0
" 14 " " " "	..	182	10	0	..	0	10	0
" 17 " " " "	..	209	17	6	..	0	11	6
" 20 " " " "	..	237	5	0	..	0	13	0
" 25 " " " "	..	255	10	0	..	0	14	0
Above 25 " " " "	..	292	0	0	..	0	16	0

Retirement.

71. The Committee also consider that it would benefit the Service if encouragement were given to the Chief Engineers to retire after the age of 50, by allowing them to reckon in the same manner as suggested for full and half-pay, all the time they have served since being confirmed as Assistant Engineer of any class, provided that at the time of confirmation they had reached the age of 20.

72. The existing Scale of Retired Pay for Chief Engineers appears to the Committee to require no change, except that no Chief Engineer, when placed on the Retired List, should receive a smaller amount of retired pay than he would have been entitled to on retirement as an Engineer. We have already suggested, that all time served as Assistant Engineer of any class (and as 3rd Engineer prior to 1847) should be allowed to reckon towards the period of service which regulates the amount of retired pay, and it appears desirable to retain the regulation by which Chief Engineers must retire at the age of 55, and have the option of retiring at 50. We recommend that those who retire after 30 years' meritorious service may be placed on the Retired Lists as Inspectors of Machinery.

Extra Pay.

73. The scale of extra pay allowed to Chief Engineers and Engineers in Charge of Engines, by the recent Circular, No. 49 A.G., 1875, is quite in accordance with our views; we would also allow the Senior Engineer in ships with engines of 3000 indicated horse-power and upwards, an addition of 1s. a day, in order that an Officer selected for so important a position should not receive less pay than if he had been placed in charge of engines in a small ship.

Chief Inspectors and Inspectors of Machinery.

74. It has been brought to our notice by the evidence we have received, that Chief Engineers have, in several instances, declined promotion to the rank of Inspector of Machinery, the reasons alleged being, that they would have a prospect of remaining on half-pay for one or two years after being promoted, and that the higher rate of full pay of Chief Engineer, with the extra pay when in charge of large engines, or with the allowance when serving in a Flag-ship, is actually greater than that of an Inspector of Machinery.

75. We think it desirable that the highest rank to which an Officer in the Engineering branch of the Service can attain should be eagerly sought after as an honorable and substantial reward for long and meritorious service, and that the responsible duties which an Inspector of Machinery is required to fulfil, should be adequately remunerated.

Full and Half Pay.

76. We recommend, therefore, that Chief Inspectors of Machinery should receive as full pay, 35s. a day, and Inspectors of Machinery 30s. a day. The officers holding the appointments of Inspectors of Machinery at the Reserves at Portsmouth, Devonport, and Chatham, should receive an additional 3s. a day.

77. The half-pay of Chief Inspectors of Machinery to be 20s. a day, and of Inspectors of Machinery, 18s. a day.

Retirement.

78. The retired pay of both ranks to be reckoned on the same scale as at present, but they should be allowed to count their time for retirement from the age of 20 in the same way as Chief Engineers. Chief Inspectors should rise to a maximum of £500 per annum, if entitled to that amount by their term of service before the age of 60.

Title.

79. The addition of the word "afloat" to the title appears to be no longer necessary, especially as in some instances a Chief Inspector will have charge of all the machinery in the Dockyard.

Number.

80. We recommend that power be retained to increase the number of Inspectors to seven, but vacancies on the list need not be filled up unless Officers of that rank are required.

Engineer Officers.

Rank.

81. We recommend that the following changes be made in the relative rank of Engineer Officers :—

Chief Inspectors to rank with Captains over 3 years standing (seniority of Captains to be reckoned from the time they complete 3 years in that rank).

Inspectors of Machinery to rank with Captains of under 3 years, according to seniority.

Chief Engineers of more than 10 years' standing to rank with Commanders, according to seniority, instead of those of 15 years, as at present.

Engineers of over 8 years' standing to rank with, but after, Lieutenants.

Assistant Engineers to rank with, but after, Sub-Lieutenants.

82. The Engineer Officers of the Navy are at present classed with the Civil Branch of the Service as distinguished from the Military or Executive Branch. This distinction appears to be no longer necessary. The Chief Engineer has a large body of men under his immediate orders, many of whom are quartered at guns, and have to take an active part in action. His duties are in many respects executive, more so than those of the Carpenter, who is classed with the Military Branch. We are therefore of opinion that Engineer Officers should in future be classed with the Military or Executive Branch of the profession, among those who would not on any occasion succeed to "Command."

Engine Room Artificers.

83. If the measures proposed by the Committee respecting the reduction of the number of Engineers in each ship be carried out, it will be necessary to take steps for the entry of a larger number of Engine Room Artificers. We have, in the course of our enquiry, obtained the evidence of numerous witnesses respecting the qualification of the Engine Room Artificers now in the Service, and have also endeavoured to ascertain the general opinion existing among themselves with regard to their pay, prospects, and position on board a ship of war.

84. We find that the Engine Room Artificers already entered are considered to be fair average workmen, capable not only of conducting repairs in their respective trades with celerity and efficiency, but of soon learning to assist each other in every description of work ; they are also considered well qualified to take charge of the watch in the stoke hold, and, after a few years' experience, to keep watch in the Engine Room of small ships, under the supervision of the Engineer in charge.

85. We have, however, learnt from various sources, that they do not feel that they are treated when afloat in such a manner as to make them reconciled to a sea life, or to encourage others to join the Service.

86. Engine Room Artificers who have served their apprenticeship as fitters or boiler makers, and have thus placed themselves in a certain position of independence, join the Naval Service at an age of between twenty and thirty, having already contracted the habits of their class on shore ; they have been accustomed to regular limited hours of work, to pass their Sundays at home, and on returning from their work daily to find their meals ready, their house cleaned for them, and themselves relieved from all supervision and work other than that of their trade. On board a ship of war they find themselves surrounded by men who have been brought up to a different system from boyhood, and who cannot therefore understand that the habits of their own ordinary course of life may prove a hardship to others, who for many years have been accustomed to an entirely different mode of living.

87. The Engine Room Artificers appear to have no objection to the nature of their work as Artificers, either afloat or in the Reserve, but they find themselves uncomfortable when off duty, their principal causes of dissatisfaction seem to be, that in some ships they have to clean out their own mess, prepare their own meals, and to be under the control of the Master-at-Arms as regards obtaining leave to go on shore.

88. The pay that the Engine Room Artificers receive on entry appears to be insufficient to enable us to procure the best qualified men, and as no increase of pay is offered after ten years' service, it is highly probable that the men now in the Service will leave it at the expiration of their first term of servitude, especially if they have such qualifica-

tions as will ensure them employment as Engineers in the merchant service, or otherwise in the private trade. Some men who have previously served as Chief Stokers may form an exception, but the number will be very small.

89. We think it desirable that the Naval Service should be enabled to obtain thoroughly well-qualified mechanics as Engine Room Artificers, whatever may be the state of the iron trade; the terms offered and position accorded to them as skilled workmen on board ship should be such as would induce a large number to enter at short notice in the event of war, when we should find those already in the Service would prove to be a valuable reserve of men, capable on an emergency of performing in some measure the duties of Naval Engineers.

Entry, Pay, and Position.—Rating of Chief Engine Room Artificer.

90. We recommend the following modifications in the existing Regulations respecting the entry, pay, and position of Engine Room Artificers.

91. A candidate should be between the ages of 21 and 30 years, and be either an Engine Fitter, a Boiler Maker, an Engine Smith, a Coppersmith, or a Pattern Maker. Of these two last-mentioned trades very few will be required. An ordinary blacksmith should not be considered eligible for entry as an Engine Room Artificer.

92. In addition to the examination now considered necessary to ascertain the qualification of a Candidate, he should be called upon to show proof of his knowledge of his trade, as well as to produce his indentures, or other evidence of his previous training.

93. He should be examined as to his knowledge of the names and uses of the principal parts of a Marine Boiler, as well as of a Marine Engine, as now ordered.

94. Before being confirmed in his rank at the expiration of a year's service, he should obtain a Certificate from the Chief Engineer, or Engineer in charge, approved by the Captain, that he is capable of taking charge of a watch in the stoke hold, and has proved himself an efficient workman.

95. We propose that Engine Room Artificers should receive the following pay:—

For the first three years	..	..	..	5s. 6d. a day.
For the next three years	..	..	..	6s. 0d. a day.

96. After serving six years an Engine Room Artificer should be eligible for promotion to the rating of Chief Engine Room Artificer, by the Admiralty if on a home station, or by the Commander-in-Chief if on a foreign station, provided that there is a vacancy in any ship on the station, and that the Engine Room Artificer is qualified as follows:—

97. He must have obtained a Certificate from the Chief Engineer, or Engineer in charge, approved by the Captain, that he is capable of being entrusted with the charge of a watch in an Engine Room, that he has borne a "very good" character for the last three years, and is a thoroughly efficient workman at his "trade."

98. A Chief Engine Room Artificer should be paid according to the following scale:—

	s.	d.
Under 3 years as Chief Engine Room Artificer	..	6 6 a-day.
" 6 "	..	7 0 "
Over 6 "	..	7 6 "

99. An Engine Room Artificer who does not obtain promotion to the rating of Chief Engine Room Artificer should receive 6s. 6d. a-day after ten years' service.

100. About one-half the Engine Room Artificers in each ship should be Chief Engine Room Artificers. Each increment of pay should be given only if character has been very good for the previous twelve months. The Captain should have the power of disrating a Chief Engine Room Artificer to an Engine Room Artificer, and of reducing the pay of either 6d. a day, for a limited period, for each case of aggravated misconduct, but the pay should not be reduced below 5s. 6d. a day.

101. The Chief Engine Room Artificers should rank next after the Writers, 1st class.

Mess.

102. We recommend that all the Engine Room Artificers should mess together, forming a separate mess, and that a suitable place should be fitted up for them in the neighbourhood of the Engine Room. Measures should be at once adopted to carry out this necessary provision, by directing the Officers of the Reserves to forward plans for this object in every ship now fitting out.

*General Treatment, Leave, Care of Mess-place, Hammocks, and Washing Arrangements.
To be placed as much as possible under control of the Chief Engineer.*

103. We are of opinion that it is entirely in the power of the Commanding Officer to make this useful class of men comfortable when afloat, and in a short time reconciled to the inconveniences inseparable from a life on board ship, without any relaxation of that strict discipline which is absolutely necessary in a ship of war. Bearing in mind the habits of life to which the Artificers have been accustomed on shore, the age at which they join the Navy, and the important nature of their duties, it will be very desirable to make a few simple regulations respecting the mode of obtaining leave to go on shore, the care of their mess-place, their hammocks, and their washing arrangements, and to place them in these and all other respects as much as possible under the control of the Chief Engineer, who is best acquainted with the duties they are required to perform, and whether they can be spared from the Engine Room. We recommend, therefore, that directions be given to ensure that these apparently minor points are carefully attended to by Commanding Officers, as we believe that the benefits which should result from the employment of Engine Room Artificers are mainly dependent on them.

Chests.

104. We recommend that they be allowed chests of the following dimensions :—

									FT.	IN.
Length	..	..	..	..	..	..	..	..	3	4
Height	..	..	..	..	..	..	..	..	2	0
Width	..	..	..	..	..	..	..	..	2	0

105. We have ascertained by actual measurement that the chests now allowed, which are somewhat smaller than the dimensions here given, are not large enough to contain their full kit.

Extra Pay.

106. When Chief Engine Room Artificers are employed on other ships than those to which they belong, under circumstances which entitle them to extra pay by the Regulations, they should receive 3s. 6d. a day, and Engine Room Artificers, 3s. a day while so employed.

Pensions.

107. Their pensions should be under the same Regulations as those of other Chief Petty Officers. If circumstances require that they should be called on to serve after having completed 20 years' service, they should receive an increase of pension for every three years served until a maximum of £60 per annum is reached.

Uniform.

108. We consider that the jacket now worn by the Engine Room Artificers is not suitable for them when on shore ; on the other hand, we do not think it desirable that they should wear a frock coat, and we therefore recommend a blue cloth tunic or close fitting pea-jacket, with uniform buttons ; blue cloth waistcoat ; blue or white trousers ; cap, the same as at present. The Chief Engine Room Artificers to wear 3 buttons on each sleeve of the tunic.

Summary of Regulations respecting Pay, Position, and Prospects to be circulated.

109. In order to ensure that the pay, position, and prospects of Engine Room Artificers in the Fleet be fully known at the various private Engine Factories throughout the country, we suggest that a concise summary of the Regulations respecting them, be circulated at the seaports and other places where qualified men are likely to be obtained. In this summary the actual amount of pension, and length of service required to earn it, should be clearly specified, as well as a detailed statement of the various advantages connected with service in the Navy.

Conclusion.

The suggestions embodied in this Report are the result of careful enquiry and mature consideration. In the opinion of the Committee they will, if fully carried out, tend materially to secure the highest mechanical skill in the management of the engines in ships of war, and add to the efficiency of Her Majesty's Naval Service ; they will also enable provision to be made for the sudden expansion of the Engineering Branch of the Service in any emergency, avoiding the serious evils which resulted during the war in the years 1854-1855 from the indiscriminate admission of Engineer Officers, with little regard to their character or qualifications. In conclusion, the Committee believe that notwithstanding the increase in the amount of the indicated horse power of the engines fit for service in the Fleet during the past ten years, the total cost of the Engineering Branch of the Navy, under the Regulations they now submit, will not be greater than it was in the years 1865-66.

The Committee have now the honour to forward their Report for the consideration of their Lordships.

A. COOPER KEY.

W. M. DOWELL.

J. E. COMMEREILL.

J. WRIGHT.

W. N. COVEY.

G. FINLAISON,

Secretary.

29th January, 1876.

APPENDIX I.

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ABSTRACT OF EVIDENCE.

CAPTAIN J. C. SOADY, R.N.

Engineer Students.—Not acquainted with regulations of 1863 for education of, but is aware that since that date are more highly trained. No opinion to offer as to result of scheme. 10–12. List of shown him far from satisfactory in a social point of view. Was not aware that any lad with a moderately good character could compete. 52–53.

Engineer Officers.—Number in “Invincible,” “Serapis,” and Indian Troop Ships. 4–6. Thinks it might be beneficial to reduce, increasing engine-room artificers, and making alterations in position and pay of both. 16, 17–19. Wish for increased pay the result, to some extent, of higher education, but also to increased cost of living. 20. Would not lower standard of education, and should like to see sons of gentlemen enter as. 21. Employment and special duties of in “Invincible.” 29–34. When “Serapis” was in harbour engineers were employed in repairing engines and boilers. 36. In case of reduction in numbers would leave question of practical training of young engineers to some one of more extended information. 51. Thinks might be recruited from a higher class, with an increase of pay and a general mess. 54–56. Messed in engineers’ mess in “Serapis.” 60–62. Promotion is very slow, earlier retirement the only way to improve. 63–64. Juniors do not have cabins—in “Invincible” only the chief engineer had—engineers sleeping in engineer’s flat. 69–74, 75. Has not heard whether general mess in gun-vessels has worked satisfactorily; junior time, all not counting, one of the grievances of. 77.

Engine-Room Artificers.—Had three in “Invincible,” duties they performed. 7–9. Do their work very well in the Steam Reserve at Chatham. 13–15. If engineer staff were reduced might be beneficial to increase, making certain alterations in their pay and position. 16–17, 19. Not in charge of engines of gunboats at Chatham: are kept for work in the factory. 18. After some 10 years’ continuous service, might have increased pay, and in some cases a warrant; would then be eligible to take charge of engines. 19, 65. Does not know where they will come from, but plenty of applications for entry at Chatham: are made by boiler-makers, fitters, moulders, and coppersmiths. They would be competent to drive engines in time, but at first only to do work as skilled mechanics. 22–28. If well trained would be capable of taking charge of sluice valves and cocks under chief engineer. 35. Men are willing to enter for present rate of pay, but get discontented after; fancies money is the reason, but a great deal also may be attributed to their treatment and management. 37–38. Could not say whether men obtained at Chatham would be equal to filling a higher position, and be able to take charge of engines constantly; as a rule they turn out to be very good and skilled men. 39–41. Those in Steam Reserve live on shore, and are married. 42. Messed by themselves in “Invincible” on the lower flat; never had any difficulty with them; a stoker was told off to clean their mess. 43–45. Hears that in small ships they complain about cleaning their messes out, scrubbing their hammocks, &c.; agrees that they have a reasonable ground of complaint, and thinks they should be exempted from coming up to muster, &c. 46–50. Were employed in harbour in the “Serapis” in the same way as the engineers; worked very well, and were quite competent to assist in adjusting slide facings. 57–58. In “Serapis” kept watch in stokehold, but not as a rule. In “Invincible” were never left in charge of boiler room. 59. Might, if warrant officers, mess with the warrant officers; would not be the slightest difficulty in finding accommodation for in either “Pallas” or “Invincible,” but does not know they could have a cabin. 65–68. Increase of pay, without the prospect of promotion to rank of warrant officers, might cause men to come into the service, but thinks rank would be the inducement, at any rate it would be to keep them in the service. Would make a man a warrant officer after 10 years’ service had expired, with an increase of pay. 70–73. Believes it would induce

present men to remain in service if they had rank of warrant officers, increased pay, and messed in warrant officers’ mess, and had same sleeping accommodation as the junior engineers. 76. Has had no experience of their purchasing their discharge. 78. In his experience have proved a satisfactory class as regards character and qualifications. 79.

In General.—Now commands Steam Reserve, Chatham; has commanded the “Serapis,” 700 nominal horse-power, “Pallas,” 600, and “Invincible,” 800.

JAMES STEIL, Esq., R.N.

Engineer Students.—Should like to see taken from a higher class. Is very surprised at list shown him, and, after seeing it, is not prepared to advocate open competition; thinks it desirable candidates should be nominated by the Board of Admiralty. 166–170. Have not too much training, would not like to see it reduced. Thinks examination on entry is quite high enough. 202–205. Is not aware what instruction they receive in iron shipbuilding. 206.

Engineer Officers.—Is not acquainted with regulations of 1863 for the better education of, but thinks they have had a beneficial effect. 82–84. Considers it is a necessity that they should be a well-educated body of officers. 85. Promotion is so slow that he thinks it is time number of should be reduced and more engine-room artificers employed. Best mode of reducing would be by entering fewer students. 86–87. Many may be induced to leave by optional retirement. Is not acquainted with regulations respecting retirement of; knows age for compulsory retirement. 89–89. Pay of an engineer is 10*s.* a-day after 10 years’ service. 99. All our engineers may be considered fitters; it is their only trade. 106–107. Should be highly trained; thinks though that the education the whole receive is beyond what is necessary, it makes them dissatisfied; dissatisfaction is not in all cases reasonable, it is not caused by the manual work they perform, but by the positions obtained by some of those who received the higher education, together with the remote prospects of promotion. 128–134. Has never heard that engineers of the present day were less capable or less inclined to undertake manual work, but if it could be undertaken by engine-room artificers it would be considered a great boon. 135–136. If numbers were reduced more rapid promotion would follow. Suggests proportion of engineers to chief engineers; that number of chief engineers should be increased, and that they should be appointed to ships commanded by commanders. 138. Complement suggested for “Sultan,” and employment of engineers in her, and in twin-screw ships. 139–146. Are appointed while machinery is being put on board in an ironclad ship, in order that they may become acquainted with cocks and valves. 147–148. If number were reduced, and work done by engine-room artificers, would not then think they were too highly educated. They are discontented because, with their high education, they are kept in an inferior position; a greater chance of promotion would remove cause of discontent. 151–152. Would continue education as at present. 153–155. In event of war, engineers would have to be reduced in commissioned ships, in order to put them into additional ships commissioned or hired, their places being taken by artificers. Thinks engineer department would be elastic enough. 162–163. Sons of gentlemen are continually training for engineers in private yards. 171. Would be desirable to establish a naval reserve amongst engineers in mercantile companies; has not thought of a plan. 180–182. In re-arranging list, would be desirable to retain sufficient to put seagoing ships in commission. 184–185. In the case of war, probably more engineers would be required than during Russian war. 186–187. Complement proposed for gunboats. 188. Pay of chief engineers, states views respecting, and suggests scale for. 191–193. Would abolish present classification, and have only chief engineers, engineers, and assistant engineers. Proposes scale of pay,

engineers and assistants, and states service and age for promotion to chief. 194-199. If number were reduced thinks younger engineers would have plenty of opportunities of learning their duties in the engine-room in large ships; would not give up a year of their training in the dockyard for them to learn the management of engines. 200-202. Pay of chief inspectors and inspectors being the same, suggests rank of chief inspector should be abolished; inspectors are the only non-executive officers whose pay does not increase with service; they are underpaid altogether; shows it is possible for a chief engineer to receive more pay; submits a scale of pay for inspectors. 206-212. Promotion to the rank of chief engineer is in a great measure by selection. 208.

Engine-Room Artificers.—Thinks there would be a difficulty in increasing number with present pay and regulations; men now serving will leave at expiration of their continuous service engagement if something is not done for them; would offer increased pay, and promotion to warrant officers to induce them to remain. 90-92. Could not have cabins, but would give them the same pay on retirement as warrant officers; thinks it would not do for them to mess with the warrant officers; should like to see engineers' mess abolished and given to them. 93-96. If they had the pay and pension would not be satisfied without the rank, which with other advantages would be a great inducement; their present pay is not sufficient; worth while to compete with private firms to retain in the service. 97-100. Thinks there is no chance of keeping men after ten years' service who are worth retaining unless inducements are given. 101. Would enter boiler-makers, blacksmiths, and fitters as; if coppersmiths could be got should certainly not reject them; larger proportion should be fitters; there ought to be one boiler-maker in each ship. 103-105. Moulder not included in trades named, but is a desirable person to have. 108. Has heard no complaints of men at present in service; as far as he knows do their work well. 109-110. If it were wanted to increase number immediately would have to be obtained from private trade, but it would be a good thing to train boys in dockyards; those so brought up should be bound for ten years, or pay a considerable sum for discharge. 111-113. When rating was established many of all trades entered from dockyards, as they were then reducing their hands and trade was slack; they received 4s. 6d. to 6s. a-day in dockyard, and increased it by going to sea, being paid for seven days instead of six. 113-115. Has heard men are quite disgusted with their treatment; chief points of complaint having to clean their mess and do other menial work, and having no one to attend on them; scrubbing hammocks might be complained of also. 116-120. Thinks are popular amongst engineers of the service; they have found them to be valuable men. 121. Considers well selected ones would on an average be quite as useful in the engine-room in a large ship as the three junior engineers; gives complements for "Sultan" and other ships. 138-141. Would be a good arrangement to appoint to a ship when engines are being put in to have charge of double-bottoms under the engineer. 149-150. Does not think artificers' mess would cause discontent; extreme pay of warrant officers with same inducements would be sufficient for engine-room artificers. 156-159. Submits scale of pay that would be adequate for those at present serving. 160-161. Reckons on their being competent to take charge of a watch after being three years at sea. 164. Must be largely increased. 165. In time of war would make up complements with; thinks it preferable to keep up a reserve and not trust to getting from private trade; in time of peace it would be a good thing to employ those reserves in the factories; there would be no difficulty. 172-176. Would be quite independent of the public in manning ships with, but all the artificers could not be employed in the reserves. 177-179.

In General.—Is a retired chief inspector of machinery, and holds position of inspecting officer of steam machinery at the Admiralty. 80-81. Iron trade at present slack. 102. Has been occasionally thrown in contact with engineers of Royal Mail Steam Packet Company, but cannot give positive information about them. 123-127. Fitters, pay in dockyards 5s. 8d. to 7s. a-day, 6s. about the average. 189.

CAPTAIN CHARLES MURRAY AYNLEY, C.B.

Engineer Students.—Fancies a great number are sons of dockyard men; not officially aware of the class from which they were taken, but return shows what he believed

to be the case; steps taken to test respectability of parents a dockyard question. 231-233. Does not approve of present educational system, because there is not enough practical education, recommends a more thorough practical knowledge than has in many cases been given. 236-239. Thinks young engineers entered are deficient as practical men; would certainly not reduce practical instruction in dockyards, a more thorough carrying out of the practical examination would benefit the service. 240-242. Practical examination is supervised by Captain of Steam Reserve, and officers have power of examining on any point; describes examination in practical work at Chatham. 243-245. Knows they are examined at the College, but is not aware of examination in practical engineering by officers of the Admiralty. 246-247. Thinks would not accept position of engine-room artificer with revised pay, unless they thought they had no chance of passing. 289.

Engineer Officers.—Numbers ought to be considerably reduced, as with present proportions promotion must be so slow that the best men will be discontented; places might be filled by engine-room artificers. 216. Well selected engine-room artificers might do duty of a portion of engineers in "Monarch," but by the substitution junior engineers would lose training in management of engines. 220-221. Thinks if were reduced a better class would enter, as they could look forward to a more rapid promotion. 234-236. In time of war, if number is reduced, a large promotion would have to be made from the junior ranks, and the junior ranks filled from the outside; engineers in merchant service might be tempted with good pay to enter. 248-250. Would be difficult to induce engineers of merchant service to join the naval reserve; thinks might be obtained for harbour defence ships, but not to go to sea. 251-253. Has no opinion to give on position of chief engineer and inspector of machinery; by employment of engine-room artificers thinks chief engineers will be in a better position; has not considered question of pay. 278. Would effect reduction of numbers by optional retirement of chief engineers, retirement of engineers with promotion, and reduction in entries of students; additional inducements to retire would have to be offered. 285-288. Has been told that if promotion was steady and quick, and engineers sooner went into the ward-room, that sons of gentlemen would wish to enter; social position would be improved by nomination by Board of Admiralty, and a good qualifying examination. 291-292. Doubts, with reference to a reserve of engineers, if men in peace time would promise to come in war time, but thinks that during war men in steamers lying by would enter for harbour work; a reserve of engineers would be a very good thing, but doubts possibility of getting one. 293-294. Chief and three engineers would be required in "Monarch," supposing that there were engine-room artificers competent to take charge of watch; states duties of. 295-299. Thinks in time of war that sufficient could be obtained for local purposes from private ships; would enter them for temporary or permanent service according to circumstances. 301-302. Would certainly keep a sufficient number for all emergencies if they could be employed profitably. 303. With the reduced numbers class entered by nomination would mess on entry in gun-room and after a time in the ward-room; engineers' mess abolished and expense saved. 304. Would not give assistant engineers commissions at once, but appoint them acting, and when confirmed give them commissions dated back; acting time should be served in a sea-going ship. 305-309. With reduced numbers junior engineers might be attached to troop and other ships to gain experience at sea. 310-311.

Engine-Room Artificers.—Thinks engineers might be reduced in number and places taken by artificers or warrant officers selected from. 216-217. Well selected might do duty of a portion of the engineers in "Monarch." 220. Object is to induce them to remain in service, and should prefer giving rather less position and emolument, and higher pension and footing to secure that, promoting a small proportion to warrant officers. 222-223. If a large number were made warrant officers it would be impossible they could all have cabins, with a limited number arrangements might be made; should mess with warrant officers to prevent discontent. 224-225. As a rule satisfied with the men obtained, but when entry has been quick some were not properly qualified; thinks there would be no difficulty in increasing number provided certain things were considered. 226-227. Can hardly say whether men will remain after their ten years' service; has no doubt those who were previously in the service will; with the fresh entries it will depend upon the ships they have been in. 228. Their pay is 5s. 9d. a-day after ten years' service, and one of the difficulties to be met is the

comparison between them and other artificers in the service ; an improvement in their position on entry will increase difficulty in entering artificers of other classes ; position of other artificers on board ship as contrasted with position of schoolfellows, or neighbours, who are engineers, deters entry as. 229-230. Come from establishments round the coast ; enter when work is slack and during strikes ; during slackness of work care has to be taken in entering, but during strikes you get good men. 254. Trained boys do enter, but proportion in the Medway is very small, and they had not been long in dockyard ; thinks permanent employment is an attraction to the best men, but a good number might enter for a shorter period. 255-256. Would not recommend training boys in the factories for, but would take more generally from round the country to get a better choice ; boys in factories to volunteer if they thought fit. 257. Very few have purchased discharge at Chatham or Sheerness ; thinks £12 is a sufficient payment for a man who has been a short time in the service, we having given no education or training. 258-260. Would not raise sum unless we educated them ; fact of being able to leave at a cost permits men to join, who otherwise would say, "If I once get into the service and do not like it I cannot get away." 261. Thinks in all cases of re-engagement there ought to be a sensible increase of pay ; is afraid if he said the wages men of their position may rise to in private trade it would not be believed ; in exceptional cases men in some of the ironworks who attend the plate mills receive as much as £800 a-year ; does not know average wages, they are higher than in the navy ; against that must be taken slackness of work, strikes, and our pensions, also the navy pay is for seven days in week, and they get rations, but there is an immense deal of task work in private trade ; £800 a-year men are task work men. 262-267. Would divide into three classes, warrant, chief petty, and petty officers, or below that ; warrant and chief petty officers not to wear a corresponding uniform to lower class ; on entry should not dress them in a blue frock, but an intermediate dress ; aware it is a grievance with those entering to have to wear a jacket instead of a coat, but also knows those who have been in the service for a long time tell them they are fortunate, as they have more money to spend in consequence. 268-269. In a ship like "Monarch," warrant and chief petty officers would mess with other warrant and chief petty officers ; as they would have served some time in a man-of-war before that rank, objection is done away with of others messing with people who quarrel, are discontented, dirty, &c. ; thinks on entry they might be excused from scrubbing, they would be in the position of petty officers, and arrangement might be made to free them ; if entered as petty officers one or two might be put into stokers' mess to get into their work, but they might be excused scrubbing mess tables, hammocks, &c. 270-272. In "Monarch" messed on starboard side of lower deck by themselves. 273-274. Messing together would depend on how men came forward ; thinks warrant officers ought to mess with warrant officers, chief petty officers with other chief petty officers ; it might be a question whether chief petty and other engine-room artificers might not mess together. 275. Would make a distinction between upper and lower class as regards messing ; does not think that difficulty would arise on account of the antecedents of the men, because by time an engine-room artificer became a warrant officer he would have been ten years in the service and got into naval habits. 276-277. Thinks if well selected would be competent to take charge of double bottoms, cocks, &c., under chief engineer ; would not take a fresh entry except he was an iron shipbuilder, who is not at present entered for rating ; should consider a boiler-maker well qualified for the duty. 272-284. 300.

In General.—Served for three years as Captain of Steam Reserve in the Medway. 213-214. The engineers in the merchant service vary very much ; has known them to be sons of naval officers and other gentlemen, on the other hand to have been persons picked up in the streets. 290.

MR. MATTHEW MCINTYRE, ENGINEER, R.N.

Engineer Students.—Should have same practical education as at present. 370-371. Has served in Steam Reserve, but is not acquainted with practical instruction given to in dockyards. 372-373. Saw some examined in Steam Reserve, but had nothing to do with examination ; could not form an opinion as to whether they are better workmen now than formerly. 397-399.

Engineer Officers.—Number in "Northumberland" and special duties of. 316-317 322-330. Considers it

desirable to reduce number and increase engine-room artificers, provided the latter are good men, the tendency now being not to press engineers when repairs have to be done, but there would be no objection to keep the artificers constantly at work ; also there would be an advantage in the way of promotion to engineers. 318-344. Thinks service would be benefited if were only superintendents. 369. To a slight extent has been thrown in contact with engineers of mercantile navy ; has no doubt they would join the service in time of war, provided inducements were great enough, but source of supply would be very unreliable and undesirable. 375-377. Pay and prospects of the best men in large steam ship companies greater than in the Navy. 378-379. Thinks feeling amongst engineers in Navy is to abolish engineers' mess place, though increased expense of other messes would weigh with some. 394-395. Recommends an engineer officer be specially appointed to look after double-bottoms, water-tight doors, pumps, &c., in large ships ; he should not be subordinate to the Chief Engineer. 406-415. An engine-room artificer would be as good a judge of double-bottoms as an engineer, but would not have the same authority ; men assisting engineer should be told off for duty alone. 416-418. According to regulations, chief engineer is responsible for double-bottom fittings, and it might be a disadvantage if he were not acquainted with all that was going on. 419-422. Largest portion of charge, but not most important would be the double-bottom ; remarks referred more especially to pumps, water-tight doors, and valves ; there was very little work in engine-room and stokehold of "Northumberland" and "Hercules" in connection with double-bottom, that would cause clashing with engine-room department 423-442. Complement proposed for "Northumberland," five engineers and five good engine-room artificers. 429-430. Abolishing rank of second class assistant, and making assistants commissioned officers from entry would give a better prospect and position to. 435-437. Is acquainted with a great many engineers who decline to qualify as chiefs in order that they may retire at the age of 45, also knows a number who are qualified propose to go at 45 if they can. 438-439. Cannot remember other grievances of at present, has mentioned about serving 16 years, without any near prospect of promotion, and increase of pay seems to be a present necessity with all ; quickness of promotion would remedy all defects in the future ; but a present remedy is wanted. 440-441.

Engine-Room Artificers.—In "Northumberland," number, trades of ; kept stokehold watch latterly, in early part of commission were not trusted with a watch. 318-320. Number might be increased with advantage, provided they were good men ; thinks ought to be better workmen than engineers are as a class, as they would be simply workmen. 340-342. Does not think those now entered are well qualified. 345-347. There will be a tendency for them to leave after 10 years' service, because they will have sea experience and be more valuable in that respect ; as workmen they would not be better than their fellows ; understands there is great discontent amongst them. 348-349. Has heard complaints in connection with their position on the lower deck ; knows their rate of pay, and that it is for seven days in the week ; if increased there would decidedly be a larger choice. 350-353. Thinks there should be some inducement offered to get a larger number, if wanted, and to retain them ; scarcely prepared to say what, but higher pay on entry must be offered to ensure better men entering. 354-355. Has never spoken to about their dress, but has heard no complaint. 356-358. Had opportunities of seeing examined when in Portsmouth reserve ; examination they passed ; were tried in factory by one of the officers as to their ability as workmen. 380-383. Those entered came from dockyards and outside ; men from private firms working in the yard were, as a rule, the best. 384-385. Had great difficulty in getting promptly number ordered to be entered ; a list of applications was kept ; inquiries always made as to antecedents, and seeing certificates was insisted on. 386-388. Of opinion if more were employed in lieu of engineers they should be of a better class than those now entered. 389. When first entered would prefer to have to do a job of work to engineer students who had completed six years at the dockyard. 400-403. If water ran out of boilers the most experienced man, whether engineer or artificer, would be the best to act in the matter ; although the man was a good workman it would not make him ready of resource. 404-405. Thinks good men could not be obtained unless nearly six shillings a-day was offered ; those from the dockyards are not good men, there is a tendency there to say that any one will do for an artificer. 431-432. No complaints to a serious extent about accommodation in

"Northumberland," it was avoided by letting a stoker help in mess; thinks they messed with other chief petty officers; the master-at-arms messed by himself. 433-435.

In General.—Has served 16 years; lately in "Northumberland" and "Adventure." 312-315. There is usually a man appointed as engine-room storekeeper; he should be competent to keep rough account of expenditure, the fair must be kept by engineer told off for the duty. 331-332. There was a steam capstan in "Northumberland"; one of the other engineers had charge of it; also Forester's steam steering engine. 333-337. Receives, after 16 years' service, ten shillings a-day; sees no prospect of increase, and has almost given up all hope of promotion. 359-362. Has been in charge of engines. 363-364. Came from the private trade, served time in Glasgow; does not count second class engineer's time, and it is almost impossible under present conditions to count time allowed. 365-368. On entry was informed was almost certain of promotion to chief engineer in twelve years, but since then time has increased until it is now nearly twenty years. 390-391. Is 38 years of age; there is no limit to promotion up to the retiring age of 50; thinks then, or even at 45, a man is hardly fit for advancement. 392-393.

JAMES ROFFEY, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Thinks have to devote so much time to study they do not consider it worth going in for practical attainments; difficulty might be overcome by severe examination in practical work before leaving dockyard; was not aware for last two years practical training was greater; when he entered engineers having no idea of being brought up for the service until called for, went on with practical work. 507-509. Does not think system of entry is good; better if nominations were given by Board of Admiralty; would be easier to do that and necessary if entries were reduced. 516-520. Does not know how are put on competition list; selection of engineers from would not check applications to become students; thinks check would be beneficial. 538-540.

Engineer Officers.—Number and duties of in "Lord Warden." 447-451. Senior engineer looked after cocks and valves, and assisted in carrying out the duties of the department; three had each charge of engines, others did extraneous work; were in four watches nearly always. 455-462. Complement would propose for "Lord Warden." 464-465. Has not much experience with the young engineers; as far as it goes, those from private yards more useful than those we educate. 477-479. Thinks it desirable to reduce number and increase engine-room artificers; there would be a better staff for repairs and more promotion, it would improve class, and present system of education could be carried on. 501-505. Is in favour of present system of education; thinks entry ought to be open to private firms. 506. Thinks promotion by seniority is best, with promotion on special occasions. 514-515. Present engineers would rather do away with engineers' mess and go into gun-room; does not think it would be an additional expense; engineers after certain service should have option of messing in ward-room. 521-524. Age for promotion to chief engineer should be 32 to 35. 525. Recommends reduction in number; has not thought how could be carried out; thinks quicker promotion is much needed; it is seldom an engineer is promoted to chief engineer before 38 to 40. 526-528. If number were reduced, plenty could be obtained in time of war by offering inducements; there have been difficulties in establishing a reserve of engineers from merchant service, but thinks would join if inducements were offered. 534-537. Proportion of engineers to chief engineers should be about 2½ to 1. 547-549. States complement for "Sultan," with reduced number of engineers and increased artificers; would not increase total number in that class of ship, but special ships require special arrangements. 550-553. Suggestions for improving position of engineer officers. 554-558.

Engine-Room Artificers.—Had two in "Lord Warden," one looked over Downton's pumps and valves; generally kept stokehold watch; trades of. 450, 456, 462-463. Trades, would wish for fitter, boilermaker, blacksmith; was generally satisfied with men he had. 466-469. Receive 5s. a-day on entry, 5s. 9d. after three years; does not think will remain after 10 years' service at the rate, because will get employment in mercantile marine as engineers. 472-475. Considers as a rule a good fitter is a better workman than an engineer student just from the dockyard. 476. Does not remember number in

fleet; did not do repairs with to other ships, but in "Lord Warden" most repairs were done by. 481-482. Number should be increased; could be obtained by offering good terms, increased pay, and after certain service to be made warrant officers. 484-487. Should mess with chief petty officers, or if inconvenient by themselves, when warrant officers with them; thinks could have separate sleeping berth, not a hammock. 488-495. In "Lord Warden" wore regulation uniform, like that of master-at-arms only with cap and badge. 496-499. Complain of want of consideration; when should be in engine-room are wanted on deck; have to scrub hammocks or clean mess; there is also a difficulty about their messing. 500. If introduced to greater extent much of manual work will be thrown on them, thinks then they and the engineers will be placed more in position of officers and working men, and that it would be beneficial. 511-513. Knows of no valid complaint about their leave regulations; had to get special arrangements made to meet difficulties. 541. Applied for another to arrange stokehold watch in "Lord Warden"; were in three watches, had one boiler-room. 542-546. Number for certain ships with reduced number of engineers. 550-553. Suggestions for improving position and providing a reserve of. 554.

In General.—Is a chief engineer, last served in "Lord Warden," 1000 horse power engines, in Mediterranean. 442-446. Has had no special employment in a steam reserve. 470-471. Not served in an iron ship. 529. In 1858, in China; was acquainted with engineers of the mercantile marine; were good engineers, but not superior to those in the service. 530-533.

THOMAS T. MURRAY, Esq., CHIEF INSPECTOR OF MACHINERY AFLOAT, R.N.

Engineer Students.—Thinks practical work has been more efficiently performed since officers of steam reserve signed certificates. 598. Has seen marked improvement since circular of May, 1873; have had to undergo an examination as to practical knowledge under his own supervision. 599-601. Practical knowledge has improved during last two years; circular has not been long enough in operation to say whether a student on completing time is equal to an engine-room artificer in knowledge of practical work. 602-603. So long as there is open competition and ability to pass, must submit to their coming from any class of society; should prefer nomination before competition. Does not consider list of those entered latterly satisfactory; one of the fruits of open competition; nomination with competition would benefit service. 618-620. Thinks are now improving; the appointment of a leading man to supervise has tended to improvement in their manual labour. 621-623.

Engineer Officers.—Complement in "Gibraltar" five. 590. Thinks might be reduced in large ships as low as to have only one in charge of a watch; has had in two watches and four, but usually in three. 592-594. During last five years has found young engineers employed in floating factory not well skilled as a rule. 595-597. Employment of in Chatham Reserve; have no mechanical duties when attached to ships in; when appointed to ships building thinks earlier appointment of chief engineers would be beneficial. 610-612-614. In "Gibraltar" messed in gun-room; thinks majority are in favour of doing away with engineers' mess; expense and arrangements of meals were objections to doing so. 615-617. The few personally known to quite capable of taking their station in any society; there are exceptions amongst from the nature of their antecedents. 624. One engineer would be sufficient for charge of the watch, provided he has good engine-room artificers under him, in "Alexandra" and ships with fore and aft bulkhead. 625-629. Not satisfied with promotion; would put a chief engineer in every ship commanded by a commander; reduction in number of engineers would be considered a boon; believes slowness of promotion is injuring service. 638-642. Would wish to see engineers promoted by seniority, with selection for special services. 643-647. Thinks pay of chief engineers throughout is insufficient; inspectors are placed at a disadvantage both as regards full and half pay; knows several chief engineers who have declined promotion, position and pay not being sufficient to induce them to serve on before being retired; chief inspectorship is honorary, something additional should mark rank if it be retained. 648-659. In time of war or peace thinks competition for entry should be open not only to dockyards, but merchant service and first-class factories; in war supposing it was by nomination, men would be obtained by increased pay; the men that we were compelled to enter

during last war lowered status of engineers for 10 or 12 years. 660-661. Should be promoted to chief by thirty years of age; was thirty-two when promoted himself. 664-688. Thinks it would be necessary to have well educated men as officers to take charge of engines; should be able to show other men how to work. 689-691.

Engine-Room Artificers.—Has had considerable experience of; are generally employed in doing work of reserve; fifteen in reserve. 563-568. No serious difficulty in keeping up number; educational requirements lowered once or twice; steps taken to obtain. 569-570. Entries made from both private trade and dockyard, some brought up as boys. 571-572. Men satisfactory as workmen as a rule. Longest service of; does not know any who entered when circular of 1868 was issued, except those who were chief stokers. 574-577. Thinks some will re-enter after ten years' service though there is dissatisfaction; grievances, nothing to look forward to in shape of promotion, and those that exist locally on board ships. Frequently detained in engine-room making necessary repairs; are not ready for quarters, &c., and then have been punished; are dissatisfied at menial work, scrubbing hammocks and cleaning messes. 580-583. Thinks with certain amount of promotion that pay on entry is sufficient, a slight increase annually would be beneficial; maximum 7s. to 8s. a-day; if some of the best were given a chance of a warrant, would increase contentment of those in service and secure a supply of better men. 584-586. Those wishing to leave at end of ten years would try and pass Board of Trade examination and enter merchant service as engineers. 587-588. Might rise to 7s. about end of ten years. 588. Would do fitting work better than young engineers. Some engineer students are well skilled, but they are the exceptions. 597. Would leave entry of artificers entirely open to dockyards and private trade; there would be difficulty in training boys for in dockyards. 604-606. Thinks if engineers were reduced it would be beneficial to appoint artificers to ships building to become acquainted with double-bottoms, water-tight doors, &c. 613-614. Is aware they are in charge of stokehold in small ships, but not aware that they were in large ships; thinks in "Alexandra" there should be four in a watch with the engineer. 630-633. Would do for duty in double-bottom when they have something to lose. 636-637. Has had no real difficulty in obtaining; a great number, though good workmen, know nothing of engine as a whole; the best men come from the smallest establishments. 665-666. They object both to their present and non increase of pay; has not heard much complaint about messing except in small ships; thinks when number is sufficient should mess by themselves, believes difficulty about clearing mess, &c., has been obviated where commanding officers made arrangements; detaches a second class stoker to attend on them in floating factory. 667-671. Could employ a larger number profitably in reserve if could get suitable work for them to do; does not think do quite as much work as good workmen in dockyard, as they cannot work quite same hours, but are quite as capable. 672-674. Thinks trades entered are good for general purposes; has found a difficulty in not having moulders. 675-676. Description of educational examination of, are not tested as workmen until they are entered. 677-678. Those newly entered are sent to sea as soon as possible to gain experience; two of same trade are not sent in one ship, if it can be avoided. 679-681. In sending to sea works as far as possible with a roster; could have a junior and senior roster were it not for anxiety to increase experienced men; fresh entries are on one; does not change staff of floating factory oftener than compelled to. 682-686. Does not communicate with other reserves with regard to men that cannot be received; thinks it would be advantageous if requirements of reserves were known to each other. 687.

In General.—Is chief inspector of machinery afloat; has been in Chatham and Sheerness reserves 5½ years; served before in "Asia" and "Gibraltar." 559-562. Has inspected, but not been to sea in a double-bottomed ship. 534-635. In mercantile marine large companies recruit engineers from various factories; from their treatment of, pay, &c., have always a supply; are chiefly sons of workmen in factories. 662-663.

JOSEPH H. ELLIS, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Practical training is not sufficiently attended to; has opportunity of judging as he has two sons who are students. 723-725. Does not see why education should prevent the acquirement of practical skill; it would be advisable a chief engineer or inspector

should have the power of testing as to practical skill; does not think chief engineer of yard ought to feel any objection. 726-727. Thinks those who have served six years could earn in dockyard the pay they receive on entering as engineers. 749-750. Learn a great deal outside; if theoretical education they received in dockyard schools was all they had we should not have the same men; do not receive sufficient instruction; thinks schoolmaster should be paid by results; is quite certain if place provided to prepare for school were only seen it would be remedied. 751-752. Parents do not pay for their six years' instruction, but work students perform in a fair equivalent; knows of another class with same advantages; has never met with a trade in which students receive instruction in addition to pay. 753-757. Gratuitous instruction ought to be taken into account in the pay they receive on joining as engineers, but the work they do should be also, they are paid for it, but not sufficiently; students who have attended to work are worth any journeyman after three years. 758-759. Inattention on part of students may cause want of interest taken in them; does not know that all work satisfactorily, but has not discovered a great want of practical skill amongst. 760-761. Fancies many would go if permitted; to keep, would appoint to a guard-ship; they should wear a uniform, be trained as now and receive higher pay—that of assistant clerks, who also receive instruction. 768-770. Though promotion of assistant clerks is very slow, their pay and position is better; the reason why so few apply to enter as assistant clerks is on account of nomination; with students you only state your wish, and this fact is detrimental to service; thinks it significant that youths who have failed to pass as students have become assistant clerks. 771-774. Approves of open competition, but better means should be adopted to ensure respectability; should go to a school or college for 12 months after competition, pay £100, and pass into service by competition again; object would be attained if nominated by Board of Admiralty. 775-777. Is quite aware where they come from, and if used as an argument against doing anything for the engineers, has been compelled to admit it with great regret. 778. Does not consider a student is satisfactorily treated in dockyard. 800.

Engineer Officers.—Duties in "Royal Alfred"; watches kept by, one was appointed to attend to sea cocks. 698-707. Considers it decidedly advisable to reduce number and increase engine-room artificers; the latter would do boiler work, repairs of pipes, &c., in bilges, which engineers feel a sort of repugnance in doing; at the same time it is absolutely essential engineers should be capable of doing the work when required. 715, 720-722. Thinks as a rule engine-room artificers are not better manual workman than the young engineers; always supervised work himself. 718-719. Thinks engineers are very inadequately paid; pay on entry should be higher, it is not that of a good mechanic in factory where they served their time; suggests scale of pay for all ranks. 743-762, 801-806. Service would be benefited if engineers were promoted to chief engineers at 35; promotion by seniority is best and fairest, supposing the man be qualified. 763-767. Fancies if engineers and assistants were allowed to go on a scale of harbour pay many of the best would. 768. Considers, with reference to reduction of number, service might be carried on with 500 engineers and assistants. 779-781. Service as second class assistants not counting is a very great source of complaint, thinks it is a hardship. 782-784. In merchant service on the whole are better paid, expenses are less and everything is found; believes amount of duty performed and actual valuable service rendered by engineers in Navy exceeds that in Mercantile Marine. 807-810. Has not had much experience in large iron-clads; would reduce engineers in "Devastation" to five. 812-813.

Engine-Room Artificers.—In "Royal Alfred" kept watch in stokehold, one a coppersmith, the other a boiler-maker; former an indifferent workman, latter one of the best men in service, and he soon picked up a knowledge of duty with boilers; thinks neither attempted anything with engines. 702, 708-710. Qualifications required on entry should be able to read, write, and give proof of their ability at their trade; before confirmation should understand how to practically manage the boiler, but would not go far into engine management; considers it desirable in large ships they should occasionally have charge of stokehold with a competent engineer in engine-room. 712-714. Has seen many at work, are not as a rule better workman than the young engineers. 716-718. Thinks are very discontented, the boiler-maker who was so good a man wished to leave service, complained of treatment on lower deck by other

petty officers; his messing in various places (master-at-arms and petty officers refused to receive him), and at having to clean mess, and so on; would have purchased discharge had he been able. 728-736. Are not satisfied with pay, ought to begin at 6s. and rise to 7s. a-day; after ten years should be promoted to leading engine-room artificer with rank of warrant officer, pay 8s. a-day, rising to maximum of 16s. 737-743. Has not heard of any dissatisfaction about uniform. 785-787. How were mustered at divisions; on Sundays were inspected by junior engineer and reported to lieutenant of division; engineer prepared slop lists. 788-790, 793-794. On ordinary days mustered for inspection at quarters; thinks it a pity artificers and stokers could not be messed and kept separately like the marines, and be responsible to the engineer for the cleanliness of their department 791. As a rule not equal in skill to average fitters in dockyards who receive 6s. a-day; thinks although he proposes more pay for them than fitters receive, it scarcely amounts to compensation for what they are called upon to submit to on board ship. 795-799.

In General.—Is a chief engineer, has been on half pay 12 months, last served in "Royal Alfred," she had 800 horse-power engines, and in engine-room four engineers and two artificers besides himself. 692-697.

JOHN H. HEFFERNAN, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Thinks mode of entry objectionable; does not know source whence they come, but has heard class from which they were drawn was becoming very bad, and that there was no check on the entries; would not bring his own sons up as engineers unless they had a better prospect. 862-864. If nomination were in hands of Admiralty, and prospects of engineers were improved, it would materially assist towards men in a higher class of society putting their sons into engineer service. Finds brother officers ambitious to enter their sons in their own line, but feels his sons ought not to become engineers under present regulations. 865-866. Is not much acquainted with education given to, but is surprised at deterioration of physique; you do not see a man amongst them; attributes it to study they have; can not give an opinion as to medical examination on entry. 884-887.

Engineer Officers.—Staff of and duties in "Crocodile"; are in four watches. 817-828. Have not so much to do with repairs as in a man-of-war. 828-830. Was about 36 when promoted out of his turn to chief engineer, for special service in "Waterwitch." 837-840. Thinks flow of promotion for engineers is not satisfactory; it would benefit service if they were promoted earlier to chief engineers; to do this would reduce number of engineers and assistants, and increase chief engineers. 841-845. With reduced scale of engineers, would have in "Crocodile" 5, and 6 to 7 artificers; would give charge of double-bottoms, &c., to an engineer; thinks it would decidedly not be satisfactory to replace whole of the engineers by artificers. 848-854. Does not consider fitters' work that engineers do the most important part of their duty; would always have well-educated body of officers in engine-room. 855-857. In troop ship, engineers, with exception of the chief, who messes in saloon, mess by themselves. 858-861. Has not thought of scale of pay for, but, if obtained for other sources, would be worth more than 6s. a-day to begin with; quicker promotion would be a boon; might abolish one rank of assistant engineer and give 7s. 6d. on entry. 869-870, 893-898. Thinks should be entered from outside from large factories; would put students on their mettle, but thoroughly good men would not compete for present pay, nor could they pass examination students do. 888-892. Could not say why system of having two chief engineers did not work well in "Warrior"; should not like divided responsibility himself; thinks two necessary in "Thunderer." 896-898. Half-pay of 6s. a-day on promotion to chief engineer is too small; has 15s. a-day full-pay himself, but does not count some of his time; thinks engineers in charge should be ward-room officers. 899-903. Considers junior time of engineers not counting a hardship. 206.

Engine-Room Artificers.—In "Crocodile," trades, boiler-maker, blacksmith and fitter; one keeps watch in stokehold, one is detached to assist with water-tight doors and general duties, are in four watches; they have not so much to do with repairs as in a man-of-war. 819-820, 825, 827, 829. Had two in "Spartan," were allowed to have charge in engine-room after being trained. 832-834-836. Should

propose to have a large number of if engineers were reduced; are generally better practical workmen than young engineers, but experience of is confined to the good men in "Spartan." 846-847. Thinks it doubtful if pay is sufficient to keep after ten years; men in private trade with same qualifications get 6s. a-day to 42s. a-week, and opportunities of overtime; ruling inducement to go to sea with men he has seen is the pension. 871-875. There was a great deal of trouble in "Spartan" about their messing; black quarter-master objected to their messing with him; matters were explained to Captain, who allowed a boy to wait on them and a chief petty officers' mess was formed. 876-879. Never expressed any feeling about their uniform. 879. Were mustered in front of stokers, facing other petty officers, and inspected by lieutenant of division. 880-882. General complaints were with regard to messing, cleaning mess and scrubbing hammocks; it is difficult for them to do their duties and these things too. 883. Thinks should have increase of pay after certain service, and that they ought to be equal in position to master-at-arms, they consider themselves put down, being No. 12; impression they would get on better without relative rank; would simply put them as chief petty officers and give them a frock coat; it would also be satisfactory to settle about their leave. 904-905.

In General.—Is a chief engineer; has been in charge of engines since 1866; now serving in "Crocodile;" sea-going staff, eight engineers and three engine-room artificers. 814-817.

CHIEF ENGINEER J. W. KING, GENERAL INSPECTOR OF NAVAL ENGINEERING WORKS UNITED STATES NAVY.

Engineer Officers.—In United States Navy, with very few exceptions, graduate in Naval Academy, the few from outside admitted as numbers could not be made up, school being recently established; they enter as cadet engineers between 16 and 20. 909-912. Course of training in Academy laid down for; after four years go to sea as cadet engineers before promotion; sign articles to serve for six years, are only bound by their honor, no cases of men wishing to leave, as it is not six years since first graduates came out; does not think they could be bound by payment of money. 913-921. Have working engine and boiler at academy. 922. After two years at sea, become assistant engineers, subject to examination; are examined as to practical work by three chief engineers; when advanced to higher promotion are examined in construction; on passing for chief examination is mostly in design and construction. 923-924. Engineers superintend on board ship, artificers do manual work. 925-926. Regulations about cadet engineers only established a few years, are believed to embody best system. 927-929. Largest ships usually carry a chief, two assistants, and three to five artificers, smallest vessels only one engineer, engines being operated by artificers; artificers are fitters, boiler makers and coppersmiths, all are under chief engineer. 930-934. In ships with compartments all connected with engines and boilers under engineer, all forward or aft is carpenters' work. 936. As a rule, engines are repaired, and in some cases constructed, in Government yards; in these yards naval engineers do all the duty; chief engineer has charge, with assistants and foremen for different branches, all work is done under his supervision. 937-943. There are civil engineers in charge of docks, wharves and buildings in yards. 944-945. In large ships, one engineer always in charge in engine-room, when number is sufficient. 946. All mess in ward-room. 947. Cadet midshipmen nominated for school by Members of Congress of the Lower House; in the case of the cadet engineers Secretary of the Navy nominates fifty or sixty boys to compete for the required number; the number allowed by law is thirty; in neither case is there a limit to the social class from which they are drawn; a large number are rejected during their four years' training; medical examination is the same for both. 948-956. Examination of cadet engineers is the same at 16 as at 20. 957-959. Is satisfied system will give a superior class of engineer officers; standard of ability so raised it was impossible to obtain outside, so education by Government was resorted to. 960. Considers it better an engineer should be able to perform manual work, but he would not be rejected if able to give proper instructions. 961. Thirty cadet engineers a-year are allowed by law, but number entered is left to Secretary of the Navy; since system has become well known there is no want of applicants. 962-963, 985. Engineer, medical and pay officers of equal grades have same pay and rank, these staff officers have same rank as

line officers except as to command; previous to law authorising this (March, 1871) there was ill feeling throughout the Navy; and great difficulty was experienced in getting and retaining satisfactory engineer officers. 964-968. Were formerly obtained from engine factories and commercial vessels; assistants did not mess in ward-room, but had an engineers' mess; this was abolished about 1869; engineers were transferred to ward-room and received all benefits of new scale of pay, position and rank. 969-975. Engineers were then received from mercantile navy, and still would be if they could pass examinations; thinks pay is less in mercantile navy. 976-978. All officers are on same footing as regards retiring pay; they retire at 62, with 75 per cent. of their full-pay; an officer may elect to retire after forty years' service. 979-984, 1085-1087. States number and relative rank of chief, first and second assistant engineers. 986-991. Thirty entries each year required to make up waste, which previous to the "rank" settlement was caused by dissatisfied men leaving. 992-994. No fixed age for promotion to chief engineer; juniors about 35 when promoted; on a vacancy occurring senior engineer is examined, if he fails the next man; on second failure to pass a man leaves the navy. 995-1000. Examination for chief mostly in design and construction; does not involve highest course of mathematics; to enable an officer at age of 35 to pass he must be always studying, there is no system except individual exertion; may sometimes be examined in anticipation of a vacancy but must be near head of list. 1001-1037. Examination for chief is the last; they pass for every grade, are examined by three chief engineers and medical officers, are not examined by former if they fail to pass the latter. 1008-1012. An engineer-in-chief and some retired staff officers have the relative flag rank of commodore; they must have served forty five years, or retired at 62 years of age with forty years' service; all officers except clerks are military officers. 1014-1015. First ten chief engineers having rank of captain do not go to sea, their duties are on shore; next fifteen are fleet engineers (similar to inspectors of machinery), one to each flag ship, having rank with commanders. 1016-1021. Engineer cadets serve their two years in any ship needing them; is not sure whether they mess with midshipmen, but have same rank and pay; they come from same social position. 1070-1075. Average age for entry 17, are engineers about 23, time for retirement counts from entry in Academy. 1076-1079. Officers mess themselves, are allowed one ration, or thirty cents a-day; they all draw the money. 1080. Become commissioned officers when appointed assistant engineers. 1081. Do test work forging, brazing, &c., while at Academy. 1082-1084. When tried by court martial there must be at least one engineer on the court. 1088. An attempt was made to make executive officers do duties of engineers, after being tried for three years was abandoned as a failure. 1093-1097. An engineer is appointed from commencement of a contract for engines, and is responsible for its being properly carried out. 1098-1100. Engineer cadets do not pay for education, they provide 100 dollars for their four years' outfit, are paid 500 dollars a-year while at Academy, and while at sea for the two years get 1000 dollars a-year. 1101-1104. There are periodical examinations at Academy, those who fail are put back into a lower class, after other failures they leave; are under same regulations as midshipmen. 1105-1108. Thinks a Member of Congress nominates from his friends, the Secretary of the Navy for engineer cadets from different applicants in the country; better class obtained by latter system; would prefer open competition with a limited number from each state. 1109-1114.

Artificers.—Pay of was raised to secure competent men; fitters receive 76½, boiler-makers and copper-smiths 41½ dollars a-months; it has not increased according to length of service yet, scale was established about three years ago, is nearly the same as in private trade on shore. 1022-1030. Are entitled to pension; they rank as petty officers. 1029-1032. Fitters' pay is higher, was raised to get competent men; they mess with master-at-arms, who is a chief petty officer. 1033-1035. Wear a dress; are not eligible for promotion, or increase of pay, under present regulations; thinks increase will have to be given them for continuous service. 1036-1044. Are entered for three years, many do leave after that time; does not think chance of a pension is an inducement to them to come. 1045-1051, 1057. Good pay and treatment are the inducements to join; cannot say whether they clean mess; pass an examination like that artificers pass for British navy; there is a difficulty in getting satisfactory men at present rate of pay. 1052-1059. Does not know present number of in U. S. Navy; they are not liable to work in yards; and men in yards do not volunteer for work afloat; service is not interchangeable. 1060-1068. On first entry there is diffi-

culty in getting them to keep watch properly; thinks three years is too short a period to enter them for, ten years is better. 1089-1090.

G. THOMPSON, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—There is facility afforded them to learn manual work, but not supervision to compel them to do so; do not bring so much practical knowledge into service as they did; instructions of 1873 would have beneficial effect if carried out. 1196-1200, 1263-1264. Does not know how are selected, system does not bring in class of men he would wish, nomination by Admiralty would be better; would not pay them for first two or three years. 1231-1233. Thinks are physically as good as they were; value of their work in dockyard more thought of than what they learn. 1258-1260. To bring up for service would combine good scientific education with a thorough practical knowledge of work required of them. 1261-1262.

Engineer Officers.—Has been twenty years in service; was six and a half months on half-pay as chief engineer, receiving 6s. a-day. 1122-1126. Promoted at 38 for Ashantee war about eighteen months before ordinary time, after eighteen years' service. 1127-1132. Did not keep watch in "Crocodile"; engineers were in four watches. 1133-1135. Ordinary promotion of engineers is not satisfactory; to improve suggests chief engineers should be allowed to retire on maximum of £400 a-year, at 50 years of age with ten years' service; are now generally 53 before they can get maximum, and 40 when promoted. 1142-1152. Thinks engineers should be allowed to retire at 40, with pension of £8 for each year's service. 1153-1154. Would replace by engine-room artificers; with reduced number, "Crocodile" ought to have a chief engineer and four engineers, with a writer to keep books, storekeeper could not be spared for that duty. 1155-1165. Chief engineer in "Crocodile" had charge of water-tight doors; senior engineer actual supervision. 1167-1171. Thinks there should be 400 engineers and assistants to an increased number of chief engineers; would like to see engineers promoted at 35, they are not satisfied with pay, which should be increased and progressive; recommends their retirement, until promotion is expedited, at 40 years of age with £160 maximum pension. 1173-1186. Suggests that engineers, instead of being employed in steam reserve in various ways, should be allowed to watch construction of iron-clad ships. 1201-1206. Reduction in numbers and supplementing by artificers would please, on account of greater chance of promotion given. 1222. Rate of promotion to chief, when he entered, was about eleven or twelve years, is now nearly twenty; obtained an educational certificate, and thinks could pass examination again with a little warning. 1223-1230. Five engineers to be smallest number in largest iron-clads; should be in three watches in iron-clads and four in troop ships; would excuse senior from watch keeping, but does not recommend one for books. 1270-1274. If number were reduced young assistant engineer should learn to keep watch under an engineer for twelve months; he ought to be competent to take charge in a small ship on first going to sea, but it would be better for him to go into large ship at first. 1275-1280.

Engine-Room Artificers.—Had three in "Crocodile"; kept stokehold watch; two were boiler makers, one a fitter, were very good men quite capable of doing their work. 1121. 1136-1141. Would have five in "Crocodile" if engineers were reduced. 1158. Thinks fitters learned duty sooner than boiler-makers. 1172. Are superior as workmen to young engineers. 1193-1194. Would be advantageous to appoint to a ship early in construction to watch over bottom and valves. 1207. Thinks would re-enter at end of ten years at present rate of pay for prospect of pension, but would not be satisfied. 1208-1211. Would at end of ten years be suitable in private trade for leading men of jobs at engineering firms, and qualified for engineers in merchant service. 1212-1213. Messed in "Crocodile" just forward of master-at-arms at a little table which was granted as a boon to chief engineer, a stoker who messed with them cleaned their mess and scrubbed their hammocks; the latter point is a great difficulty with them. 1214-1219. Uniform the same as at present, does not wish to see any change. 1220-1221. Are not satisfied, pay is too small and position not what they wish; they expect 7s. a-day to commence with, and to become warrant officers, thinks it would be a good thing for a limited number to attain that rank. 1234-1238. Have substantially same pay as fitters in dockyards; they get lodgings but have to leave homes and go to sea. 1239-1246.

Suggest should be sent in large ships to learn to keep watch; in "Dromedary" one who did duty as engineer, had never been in another ship before. 1244-1245. If were allowed to rise to warrant officers would not then be satisfied, they expect a mess berth. 1246-1249. Would allow about forty to become warrant officers, should appoint them to large iron-clads to attend, under chief engineer, to double-bottom, water-tight doors, &c., 1250-1252.

In General.—Is taking weights of machinery of Turkish iron-clads; last served in "Dromedary"; before that was senior engineer in "Crocodile." 1115-1119. Served time at engineering firm in Leicestershire, worked at Woolwich Arsenal, and then passed examination and entered service. 1187-1191.

THOMAS A. HEARSON, Esq., R.N., INSTRUCTOR IN APPLIED MECHANICS, ROYAL NAVAL COLLEGE.

Engineer Students.—Was not satisfied with practical instruction he received when a student; had no examination in practical work; thinks Circular of 1873 has caused improvement; but is neither thoroughly carried out nor perfect; work chosen is not best suited for teaching. 1321-1326. Decidedly desirable should attend drawing classes. 1327-1329. Would not say there should be change in mode of entry, except Greenwich School boys should not be specially educated to join; object would be gained if were nominated by the Admiralty, but competition should not be diminished; educational test should be test of social status. 1332-1337. Are not treated in dockyard as if they were to become officers; searched by police; have no place for changing clothes, &c.; treatment prevents sons of gentlemen entering. 1366-1367. Thinks have too much evening study; that more instructions should be given in engineering knowledge, and they should have lectures upon the steam-engine. 1368-1370. Would extend drawing instruction. 1371-1372.

Engineer Officers.—Served in "Agincourt"; she had one chief engineer, and seven engineers. 1285-1287. Has heard complaints of slowness of promotion; to expedite it would offer junior time to chief engineers to induce them to retire. 1299-1302. Would allow engineers to retire at any age on present scale; there might be danger of losing the best men; thinks engineers would go from middle and upper parts of list. 1303-1309. Advantageous to reduce number of engineers in service, and in each ship; five and a chief would be sufficient in "Agincourt." 1310-1312. Had no experience in management of engine before he went to sea, or opportunity of learning; was given charge of a watch in "Agincourt" after two or three months. 1313-1319. Grievances are want of cabin accommodation, and mess berth being nearly always in the dark away from other officers; could be remedied more easily if number were reduced. 1330-1331-1344. Would desire to see reduced number admitted to ward and gun-room messes; thinks the one or two boys from a comparatively low class of society, being of superior intellect would be fitted by their training and intercourse to be admitted. 1338-1340. Quick promotion would not be so important to an engineer if he were made more comfortable; should be a chief one-third of his service. 1340-1341. Engineers should have progressive pay—12s. a-day, if not promoted at 40; juniors to commence on 7s., and be made commissioned officers on joining; would be good for service if were acting for the first year; has not considered question of counting time. 1344-1357. Not satisfied with prospects; thinks those who have attended advanced course of study should be appointed to the Admiralty, home and foreign dockyards, or to inspect erection of engines, and have prospect of earlier promotion; these prospects would be sufficient for the two highly-qualified men each year. 1352-1357. Suggests some engineers should be entered from private firms; should pass similar examination to that which students pass. 1373-1375.

Engine-Room Artificers.—Had in "Agincourt" a boiler-maker and two fitters; were very good men; does not think, as a rule, are better workmen than young engineers. 1288-1290. Were at advanced pay of 5s. 9d. a-day; cannot say whether will remain after their ten years' service; are moderately satisfied, but not with messing arrangements; they messed at a mess-table on main-deck close forward by themselves; had a boy to clean mess; thinks did not scrub hammocks. 1291-1298. Mustered at divisions near stokers; were practically not inspected; an engineer took their slop list. 1358-1363. Complained of their uniform; wanted a coat; they also wanted a larger chest. 1364-1365.

CAPTAIN WILLIAM ARTHUR, R.N.

Engineer Students.—Considers should be nominated by the Admiralty; recommends their being boarded at some establishment like Naval College at Portsmouth, and that a sum be paid towards expenses by parents; thinks it very desirable should be drawn from a higher social class. 1400-1402. If position were improved, should say there would not be difficulty in getting sons of gentlemen to enter. 1439. Should prefer to see, although practical engineers enough to judge a job of work, more fully instructed in scientific and other branches of profession, and placed under continued supervision. 1451.

Engineer Officers.—Seldom had less than six in "Iron Duke" besides chief, were in three watches; there was divided responsibility about charge of water-tight doors, valves, &c., between chief engineer and carpenter; were under the former, but senior engineer was also in charge. 1377-1378, 1389-1392, 1433-1435. Thinks might be reduced if trustworthy engine-room artificers were in charge of stokehold; considers it would still be desirable if artificers were increased to have a small body of well-educated men in charge of engine-room; status of engineers would be raised if they had less to do with manual work. 1396-1399. Has seen great necessity to increase social status; has also seen improvement in last few years; until they raise themselves you cannot introduce them into society you would wish, or into ward and gun-room messes; should look forward to time when social position is so improved as to enable them to join gun-room mess, at present sees difficulties, their age and being married men. 1402. At certain periods pay is very good; would propose in case of alterations in, to give it to inspectors of machinery and senior chief engineers. 1403. Sees no reason why chief engineers should not have charge of engines in ships under a commander's command; this would increase number, and give promotion sooner; thinks an engineer should be promoted before age of 35. Does not consider step in pay chief engineer receives is equivalent to step in rank. 1403-1406. In "Iron Duke" cost of mess was always less than they were allowed to spend. 1407-1409. Chief engineer and carpenter conjointly responsible in "Iron Duke" for condition of double-bottom. 1438. Want of promotion amongst engineers, and consequent length of time they are kept before being allowed to mess in ward-room, and chief engineers having more junior time than other officers, which affects their pay, are grievances; thinks inspectors of machinery are not adequately paid, pay should be progressive. 1440-1441. Has not thought of proportion junior ranks should bear to chief engineers, but there would be no difficulty in calculating it. 1442-1443. Would have for "Iron Duke," supposing engine-room artificers able to keep watch, a chief engineer, three engineers watch keepers, and a senior, for general duties, and six engine-room artificers. 1444-1446. To increase number in event of war would pay on a plan similar to that suggested by him some years since as applicable to chaplains and surgeons; men entered during Crimean war as temporary service engineers on a high rate of pay were not qualified for duties they had to perform. 1447. Looks forward to time when it could be possible to assimilate, as in American Navy, officers of different branches as regard status and privileges, but thinks it will be several years before messes can be mixed up together; payment in American Navy is on an entirely different principle to ours. 1449. Considers junior engineers not so efficient as engine-room artificers in performing practical repairs. 1450. Has heard complaints from relative to difference made in privileges of respective messes; in most cases considered them trivial; also about invitations which when addressed to "To the Officers of the ship" he considered applied to engineers; heard of, but never saw memorandum that invitations so addressed were not to include; knows invitations have been worded for the purpose of excluding. Do not mix in same society as midshipmen; question is a social one, which time and their own merits may settle. 1452-1454. Means, as to their not being so much working men, that they are not seen handling hammer and chisel so frequently; would relieve from manual labour if number were reduced, but must be capable and would expect them to do repairs in an emergency. 1457-1459. Are not generally healthy, attributes it to not taking out-door exercise more than anything else. 1462. Would examine men entered for short service in an emergency in practical work only, except as to taking indicator diagrams; no objection to extending system to engine-room artificers, but class of men would try to induce to enter would be engineers from large merchant steamers. 1463-1465.

Engine-Room Artificers.—Had three in "Iron Duke," a fitter, moulder, and a boiler-maker; did duty very satisfactorily; a little difficulty at first about discipline, returning from leave, &c. 1379-1384. Messed with petty officers; helped to clean their mess; had a junior stoker to attend to. 1385-1388. Occasionally kept watch in "Iron Duke"; were lent to gunboats as regular watch keepers. 1390. Kept engines and boilers of "Iron Duke" in repair during commission. 1393-1395. Should not allow to have charge of stokehold until had five years' service and passed a satisfactory examination; would be qualified then to keep watch in engine-room of a small vessel. 1396-1398. Improvement of uniform should be considered with question of improving that of other chief petty officers; would like to see all chief petty officers have a mess place, bulkheaded on foremast and aftermast sides; if engine-room artificers messed with chief petty officers of seamen class it would increase respect for them. 1410-1411. In ships like "Iron Duke" should mess in flat chief petty officers selected; would like to see servant entered for purpose of attending on, or boy told off for duty; chief petty officers always willingly cleaned mess; they get people to scrub their hammocks as a rule. 1412-1413. Sees no reason to alter regulations for treatment, their being unaccustomed to service would be considered by every Captain; after a few months as well conducted as seamen chief petty officers. 1414. Recommends same uniform as master-at-arms for all chief petty officers. 1415-1416. Have a satisfactory uniform at present; might be promoted to warrant officers after ten years' service as an inducement to re-enter; promotion to this rank would guard against introducing engineers under another name. 1417-1424. Thinks half would re-enter after ten years' service if inducements were held out; if more were required would increase pay after six years on passing an examination. 1425-1428, 1456. Would come from private or dockyard factories; is aware wages paid in private trade are higher than on board ship, but many go to sea from roving disposition, and there can lay by pay; younger men do not consider pension; if they re-entered would not be inclined to leave until they received it; are frequently tempted, by higher wages offered on shore on foreign stations, to leave. 1429-1432. Senior engineer inspected and reported to commanding officer; were again inspected at captain's inspection of divisions. 1448. Would not bring up as long as could be obtained in any other way; pay on joining sufficient, but should be progressive. 1455-1456. One lent to gun-boat kept watch, and his services were spoken highly of; in "Iron Duke" generally employed practically, and seldom kept watch. 1460-1461.

In General.—Last service was in command of "Iron Duke" flagship on China station. 1376. Double-bottom of "Iron Duke" was covered with cement; it was for ballast. 1436-1437.

MR. CHARLES E. UFFINDELL, ENGINEER, R.N.

Engineer Students.—Thinks engine-room artificers are as good workmen as; students who enter are backward in mechanical abilities, sufficient attention not paid to practical training; a difference made since end of 1873, it seems to tend to improvement in practical knowledge; but they should undergo examinations during studentship in practical knowledge. 1563-1565. Present system of entry is not a good one, ought to be more carefully selected, and social position raised in some way. 1586-1587. Education is very good, except as regards mechanical abilities. 1663.

Engineer Officers.—Not satisfied with condition of engineers' list; has been eight and a half years an engineer; does not see any chance of being promoted to chief engineer; is 35 years of age. 1534-1538. Has not qualified for promotion to chief because there is not the slightest chance of promotion, and he wishes to be able to leave service at any time after the age of 45. 1539-1543. In ordinary course would not be promoted for next ten years; even if he were promoted in eight years it would be no use, as he would be then not fit for promotion; will retire as soon as he can. 1544-1545. Cannot retire under present regulations for ten years; would do so at once if he could with the time that would be given him; in ten years could retire on maximum of £130 a-year. 1546-1550. 1600-1603. Average age for his standing is young; entered in 1859, before entry of students. 1551-1553. To improve position suggests number be greatly reduced; would stop entries and offer retirement to older engineers, a great number of whom are too old to be at sea, being

about 45; would enter engine-room artificers to fill up numbers on board ship, if engineers were reduced. 1554-1557. Would want more artificers to do work as we have not engineers; engineers are more skilled than first and second assistants; there may be cases of engineers not being such good workmen as they might be; has seen a few. 1566-1568. Thinks after certain service engineers should go into ward-room, does not think they could on their present pay if married men. 1570-1571. In "Fire Queen" there is a good mess forward; does not mess on board; staff commander messes by himself. 1572-1576. To be beneficial to service and man, an engineer should be promoted to chief engineer at 35; by putting chief engineers into smaller ships a greater number of engineers could be promoted and engineers would be proportionally reduced. 1577-1579. A good thing to admit engineers from private trade; thinks would pass same examinations as students do, if made worth their while, and be a better class of men. 1586, 1588-1590. Pay should be 7s. 6d. or 8s. a-day on joining; if taken from outside will be already educated. 1591-1594. Thinks it only fair all junior time should count; an engineer should rise to 14s. a-day before promotion. 1595-1596. If chief engineers ranked higher it would be better; no doubt would rather have increase of pay than rank; position not much use without pay. 1597-1599. To induce men of a higher social class to enter would give a better position on board ship; if obtained from outside would enter at 21; would then be educated and able to take charge of engines; should enter as commissioned officers, with pay about 8s. a-day, to increase after service; would give as engineers relative rank of sub-lieutenant; after certain number of years would put in ward-room, doing away with engineers' mess; should promote them to chief at 35, letting all time count for retirement. 1604-1607. Thinks qualifications for those entering at 21 from outside should be same as at present, they are very good; would not insist on their having been at sea; would be able to take charge of engines, was obliged to himself, and had never been to sea before; was sea sick, but kept on watch. 1608-1613. Not acquainted with examination at naval college; believes outsiders could be called on to pass an equally good one; supposes men of higher social position from outside would obtain practical knowledge in large firms as apprentices, five years at least would be necessary to obtain it. 1614-1619. Would be a convenient arrangement for one engineer to have charge of auxiliary engines, water-tight doors and double-bottoms; he ought to keep watch as well. 1637-1638. If allowed to retire would go into some private firm to take charge of pumping stations, or something of that kind; most likely not to sea. 1639-1641. Thinks if all were allowed to retire on a scale of pay according to service, older men would go, because their prospects are blighted. Has about three or four months' harbour service; has been on full-pay whole of his time; does not know what a chief engineer would retire on after five years' service. 1642-1645. An engineer in charge of a vessel gets more pay than an engineer in merchant service; assistant engineers about same rate. 1654-1655. In time of war if engineers were reduced should have to make up with engine-room artificers; would certainly have engineers in all ships. 1656-1658. If you commissioned 250 pendants you would almost require a reserve; afraid merchant service engineers would be adrift, because there is so much routine; men came before, but does not think they would come again so easily; merchant ships are all about the same, but engines of our large ships are very complicated. 1659-1661. Thinks many engineers would mess in ward-room, if privilege were accorded, provided pay was increased; advocates promotion by seniority; if engineers were promoted at 35, should say 12s. a-day would be satisfactory pay at time of promotion. 1664-1666.

Engine-Room Artificers.—In "Hercules" trades, fitter, blacksmith, boilermaker, and an engine erector; all but fitter were thoroughly useful; they had 5s. a-day in 1868; fitter sent out of service as useless; two out of remaining three still in service. 1503-1510. Thinks will not re-enter after ten years' service; are not satisfied; pay not sufficiently high; good men on shore work up to 6s., 7s., or 8s. a-day; boilermakers get 6s. a-day in private trade, fitters receive better pay; in dockyards get about the same. 1511-1516. Should be more fitters than boiler-makers in a ship; pay to get good men should be at very least 5s. 6d. or 6s. a-day on entry; increasing after three years up to 6s. 6d. or 7s. a-day. 1517-1520. After ten years' service should be kept as engine-room artificers, and not have rank above; would give increased pay due to increased value. 1521-1522. In "Hercules" kept watch in stokehold at times; has known of cases where they have kept watch in engine-room of small ships; after two

years ought to be examined as to qualifications for keeping watch in engine-room. 1523-1525. Accommodation on board ship is very bad indeed; would be better if they had a mess to themselves, and were made a little more comfortable; cleaning out mess a great drawback, are not accustomed to it, has known of cases where they have been called away from duty to clean out. 1526-1528. Thinks many do not come from dockyards as they are better off there. 1529-1530. Uniform is a suitable one; heard one case of complaint about not having frock coat the same as writers. 1531-1533. Could get as good workmen from as from old engineers, provided you had good men. 1569. Increased number would be obtained from outside if inducements were held out; pay 5s. 6d. or 6s. a-day on entry. 1620-1621. In "Hercules" were dissatisfied in way they were put upon; had no friends, and no one to look after them; wanted a mess to themselves apart from ship's company; do not like to be with master-at-arms, always clashing; interfered with too much; should be under chief engineer. 1622-1627. Might mess in some vessels on engine-room flat, too warm in "Hercules," messed in her on mess deck; believes had a table to themselves; used to clean their own mess; settled down after a year to a certain extent, but did not like not having a place to themselves. 1628-1632. Has not served in a small ship with. 1634. Does not see why any difference should be made in pay according to trade, one is made as valuable as another, and there would be a drawback in having different rates. 1635-1636. Has not met many leading stokers or stoker mechanics who would be fitted for artificers; thinks class of men we have good enough; there will be difficulty in obtaining at present pay, and unless position is altered and they have better accommodation; does not anticipate any difficulty in making a contented class. 1667-1671. Prospect of being made warrant officers might be an inducement to them, but would not be good for service. 1672-1674. With increase of pay he proposes does not think there would be difficulty in obtaining or retaining; would re-enter after ten years if had better position and more accommodation. 1675-1676. Would give rating between chief petty and warrant officer; mess place away from ship's company, and a servant to clean out; having to scrub hammocks and so on very disagreeable to them. 1677. Does not think way they mustered at divisions in "Hercules" was felt as a grievance; cannot remember whether in his time they were put in a separate mess with stoker to look after and clean it. 1678-1680.

In General.—Is in charge of engines of "Fire Queen"; last sea going ship "Lord Warden"; served in "Ranger," "Hercules," and "Invincible." 1466-1470. Standing as engineer 8½ years; has served 16½ years; pay 10s. a-day, and 1s. charge money. 1471-1474. Just over three years in "Hercules"; she had nine engineers and four artificers; was at first third, afterwards second engineer. 1475-1479. Looked after double-bottoms, bulkheads, valves, water-tight doors, auxiliary engines, and gear; kept watch besides. 1480-1489. Had charge of double-bottom throughout ship; carpenter shared charge; inspected and reported together very often; considered himself responsible to chief engineer; had entire charge of water-tight doors. 1490-1499, 1649-1652. Bottom of ship was covered with cement; rather wanted repair; used to peel off. 1500-1502. Four engineers and a chief would be sufficient for ship like "Hercules"; if engineers are reduced more artificers would be required; there are 13 engineers and artificers now, and you would require 14 then. 1558-1562. Served time with Great Eastern Railway on their boats and locomotives; was in factory on shore; joined service at 19; not at sea before. 1580-1585. With four engineers in "Hercules," artificers should keep watch; engineers not keeping as at present, but being answerable for its being kept; necessary to place an engineer in charge of double-bottoms, thinks with four there would be enough for that. 1646-1648.

CAPT. RICHARD VESEY HAMILTON, R.N., C.B.

Engineer Students.—None at Pembroke Dockyard. 1684. Was present at final examination of at Devonport: first time chief engineer of yard conducted examination, last time inspector of machinery and a chief engineer, R.N., attended; better satisfied with practical work the last time. 1716-1724. Thinks selection of depends entirely on examination; is aware they come from all classes; no social class is excluded by the competitive examination, and under these conditions their social condition cannot be improved; thinks if number entered is reduced, it would certainly be desirable they should be

nominated by Board of Admiralty. 1725-1733. Have no opportunity of acquiring knowledge of engines beyond that afforded by steam reserve trials. 1783. Cannot say whether kept aloof from factory men; are not looked after enough; one leading man is not sufficient to look after them properly. 1802.

Engineer Officers.—Cannot say whether it would be an advantage, but looks upon decrease in numbers as inevitable on account of promotion; supposes list could be reduced by retirement. 1705-1709-1713. Thinks are a little over-educated, but there is no fault to find with their practical work; are quite equal to any job expected of them; considers there still must be a small body of well-educated officers in engine-room, if engine-room artificers are increased. 1714-1715. Position might be made such in future that gentlemen's sons would enter; it would be a difficult matter, as there must be a considerable amount of manual and dirty work. 1734. There ought to be a mess provided for them after they come from Greenwich, is strong upon the point; experience gained at Greenwich would enable them to conduct it, under supervision of the Captain of the Reserve and inspector of machinery. 1735-1739. Recommends engineers should be promoted to chief engineers by selection with a portion by seniority; age of 42 is too old for promotion, should not be beyond 35. 1740-1741. Pay of 10s. a-day is not sufficient when promoted at 42, would be if were promoted at 30; more rapid promotion would be equivalent to increase of pay. Half-pay is 6s. a-day; are not particularly worse than anyone else; but half-pay is not sufficient for anybody. 1742-1746. Would have to recruit in time of war in same way as during Crimean war, could not be taken from merchant service, as more would be wanted there. 1755-1756. When they first go to sea as assistants are not fit to take charge of a watch; in steam reserve are occasionally employed in tugs; would rather place an experienced engine-room artificer in charge of a watch than a young engineer in his first essay. 1782, 1784-1785. Having two engineers and two engine-room artificers in "Fantome" answered in England but cannot say whether it does abroad. 1793. If number were reduced does not think it would be advisable to have present class in gun-room, they had better join ward-room mess; abolition of engineers' mess is inevitable. 1794. Would be better to give engineers over a certain age a cabin with three berths, instead of their sleeping in hammocks. 1795-1796. Not desirable to obtain from outside, fully agrees with present system of training, thinks improvement in condition has arisen from system laid down in 1863. 1799-1801.

Engine-Room Artificers.—Entered a good many while Captain of Reserve at Devonport; there were about eight or ten disposable at a time; at first there was great difficulty in obtaining, latterly they came in more readily; not many who offered themselves were unfit, as most came from the factory. 1685-1689. Coppersmiths were the most difficult to obtain, fitters and boiler makers entered pretty freely; pension is the inducement for men from factory to enter, knows case of a young married man who after weighing all the disadvantages entered because at 45 he would have a pension £50 a-year, he was receiving about 5s. 6d. a-day in factory. 1690-1696. Thinks are well paid for station in life, no difficulties about pay on entering, but it certainly would be better to raise it after ten years; most men come from factory; those there, seeing artificers getting their ten days' leave, thought there must be a little leisure in the service; considers with advantages offered 5s. a-day on entry is sufficient pay. 1697-1700. Obligated to send several to sea almost at once after joining; those entered were all very good workmen; supposes would do a job of practical work better than young engineers, though the latter, considering training, did wonderfully well practically; would not recommend improvement in condition any more than in any other chief petty officers; shall have to bring up ourselves. 1701-1704. Should doubt at present time being able to obtain a large increase of; maximum number of fifteen allowed on "Indus" never attained, at Keyham none came from iron trade but from factory; imagines were brought up as boys in factory. 1710-1712. To obtain in large numbers would bring up as boys; would bind to serve; applied to Portsmouth for supernumeraries when there were vacancies, but not for applicants for entry; thinks would be good to establish system of keeping a list of applicants; private factories are aware of advantages offered to. 1760-1766. Join service too old to take readily to sea life; never questioned those who returned from sea-going ships; has no other suggestions to offer regarding improving position. 1767-1770. Does not know anything about mess; in small

craft complaint was that there was no one to look after it, and they could not leave engine-room when pipe went for dinner. 1771-1773. Their being able to take charge of stokehold after a year's service depends on ship being much at sea, thinks there should be a vessel to train both young engineers and artificers in on entry; as a rule are capable of taking charge of engines in small vessels after three years at sea. 1786-1787. Would not suggest any difference of pay between classes, with exception of copper-smiths, it would create a difficulty. 1788. Would prefer one who has been a leading stoker, but majority of engineers are against it, are not mechanics they say; armourers have been passed, knew perhaps the mechanical duties, but nothing about the engine, they learn enough to pass a *vised voce* examination, there is an order now not to take them as artificers. 1789-1792.

In General.—Is superintendent of Pembroke yard, was captain of reserve at Devonport, has commanded an iron clad, the "Achilles"; she had for coastguard harbour complement a chief and four engineers, and for sea-going a chief and seven engineers; if engine-room artificers were increased she should at least have a chief and four engineers and six or seven artificers. 1681-1683, 1747-1751. "Achilles" had engines of 1250 nominal horse power, were easily managed, "Amethyst" and "Modeste" with compound engines would require as many engineers as she had. Thinks if a certain complement of engineers and artificers is sufficient to maintain engines during a commission, if no difference is made in the proportions the total number should be the same. 1752-1754. Often in contact with engineers of merchant service; should say pay and position, except in case of chief engineers, was very inferior to those in service. 1757-1758. Senior engineer in "Achilles" was in charge of double-bottom, chief engineer was responsible; carpenter went round as directed by instructions, it worked satisfactory; thinks chief engineer ought to be responsible for all inside engine-room, carpenter for other parts. 1774-1779. Should be very sorry to do away with the carpenter in iron ships, there is plenty of work for him; would rather do away with the gunner or boatswain. 1797-1798.

**RICHARD SAMPSON, Esq., INSPECTOR OF
MACHINERY AFLOAT, R.N.**

Engineer Students.—Thinks only apply to admiral superintendent of a yard to have names put down for entry before going up for competitive examination; system not good; suggests should be nominated, regard being paid to their respectability. 1875-1878. If nominated by Admiralty, and improvement made in condition, would be obtained from superior social class. 1879-1881. Would give marks for practical efficiency; suggests a college where they could reside and mess, to improve position while in dockyards. 1882-1887, 1893. Parentage of those recently entered decidedly not satisfactory, is why he recommends nomination; thinks there would be no difficulty in getting sons of gentlemen to enter if made worth their while, and they were put on same footing as other officers. 1897-1898. Six years in dockyards as a rule ample time to make them engineers, but to fit them for position of officers should like to give them a mess place, or have a college for them. 1917-1919.

Engineer Officers.—Finds older officers better practical workmen than younger ones. 1812. "Minotaur" has a chief and seven engineers; were in four watches in "Agincourt," but a change was made, the captain not thinking it right artificers should be in charge of stokehold or boilers. 1845-1847. Thinks promotion is most unsatisfactory; to improve, would make it worth while for senior engineers over 40 to retire, filling their places with a better class of engine-room artificers; considers on the whole that junior engineers are better practical workmen than engine-room artificers, on account of the source from which the latter are taken. 1851-1855, 1858. To improve promotion would increase number of chief engineers and appoint them to vessels according to indicated horse-power; thinks engineers are very badly paid, pay ought to be progressive; suggests doing away with assistants, having one list of engineers; juniors to have 7s. 6d. a-day, after eighteen years 14s. a-day; would give juniors 7s. 6d. a-day, because 6s. a-day is starvation pay, and duties of an engineer are more onerous and difficult now, also engine-room takes a good bit off his life. 1859-1867. Does not consider engineers have great advantages in not being placed on half-pay; was sixteen months on half-pay of 5s. a-day as a chief engineer, and about half his time as inspector. 1868-1869. Thinks pay as inspector

should increase 1s. a-day, after twenty-four years' service to 34s. a-day; it now compares unfavourably with other civil branches, and chief engineers with allowances can receive as much, if in flag ships more than inspectors; has just been deprived of privileges he enjoyed when in "Agincourt" relative to supply of furniture; has made representations about it, thinks to be given rank and not the little privileges attending it is not fair. 1870-1874. In "Minotaur" all engineers except chief sleep in hammocks; it would be a great boon to give a cabin with three berths; if number were reduced engineers' mess berth might be done away with and made a sleeping place. 1888-1889. Considers unless under special circumstances should not be promoted to chief engineers over 40; should like to see promoted at 30 or 33; promotion to be partly by seniority, partly by selection. 1890-1891. Would keep ranks of chief inspector and inspector of machinery separate; does not like title, and suggests a change of. 1894-1896. Taking engineers as a body, thinks are second to none; when ward-room officers of an American corvette dined on board "Agincourt" a passed assistant-engineer came, he had same dress and pay as passed assistant-surgeon and passed assistant-paymaster, thinks is a beautiful piece of simplicity. 1898. In event of war should invite from outside, but not same class as were entered during Crimean War; if young gentlemen were invited in peace time same class would be available in event of war. 1901-1902. Engineers wish to be retired, not pensioned, to have engineers' mess abolished, to mess in gun-room, and, after certain service, in ward-room; in introducing to these messes exceptions would have to be made, some would not care to go on present rate of pay. 1905-1907. Has found juniors deficient in practical knowledge, may be due to want of willingness. 1915-1916. Does not think if a chief engineer were appointed to a ship with engines of 700 indicated horse-power, he would mind keeping a watch. 1920-1922.

Engine-Room Artificer.—Have very fair qualifications as a body; in Channel Fleet there were one or two very good men, but others only moderate; the best was a fitter, next best a boiler-maker; boiler-makers are the best as a rule. 1808-1811, 1813. There are twenty-one in Channel Squadron; instead of present proportion thinks there ought to be six fitters to three boiler-makers, and one of other trades; copper-smith for fleet is a very good man. 1814-1817. Has not felt any difficulty in filling up vacancies in squadron; does not think best men will remain after ten years, there is dissatisfaction at treatment, messing, &c.; in "Minotaur" have a little mess to themselves on engine-room flat. 1818-1822. Consider they are interfered with by master-at-arms; often in engine-room and cannot clean mess; best mess place is in "Sultan," in her they have a second-class stoker to attend on them; if could have a servant it would be better; hammocks are another difficulty, thinks would be well if they had the option of paying a hammockman. 1823-1829. Trades unions look on a man who enters as an engine-room artificer as degrading himself; knows an artificer who purchased his discharge on account of discomfort; artificers complain of chest, want a larger one. 1829-1832, 1837. Do not provide tools. 1833-1834. Pay ought to be increased a little on entry to induce to come; would give 5s. 6d. on entry, and after fifteen to twenty years' service 7s. 6d. a-day; complain about uniform, want a single-breasted frock-coat. 1835-1837. There is room for improvement of position by giving progressive pay. 1838-1839. A man who had left service invalided receives 5s. 6d. a-day in Portsmouth Factory, as an artificer, when in service, he would have received after three years 5s. 9d. for seven days in the week, and had rations, permanent employment, and chance of pension, but against these advantages are to be weighed overtime and being always at home. 1840-1844. There were three in "Minotaur" and a copper-smith extra for squadron; in "Agincourt" captain did not think it right should be in charge of stokehold; does not see the least objection to it, stokehold is their place, and it seems unnecessary to have an engineer there. 1846-1850. If engineers are reduced, only thoroughly good workmen ought to be entered as artificers. 1856. Would train in dockyards, there would be better means of ascertaining if they had properly learnt their trade. 1899-1900. In "Agincourt" were inspected by engineers, does not know where they fell in at muster. 1909-1911. Messed with chief petty officers; thinks did not answer, but never heard complaints; in "Minotaur" they want a rail to keep them separate; have to go to same place as stokers to wash or bathe; if number is wanted to be increased, little comforts, such as small mess place, servant to attend on, and option of paying for hammockmen, should be allowed; if were

put under chief engineer thinks rating they have need not be cared about. 1912-1914. In Channel Squadron some are entrusted with watch in stokehold, but should say not in engine-room, and have no opportunities of learning; it is part of regulations that they should be able to keep watch in engine-room before confirmation, and they bring certificates, but does not believe they have kept watch there, thinks that part might be left out. 1923-1928. To train, would put one or two additional in each of the ships of the Channel Fleet. 1929-1930.

In General.—Is serving in Channel Squadron as inspector of machinery afloat; served five weeks in steam reserve, Keyham; then in "Euphrates" on special coal trials; before that, was invalided from Hong Kong Yard; from 1863-1868 was chief engineer of "Prince Consort." 1803-1807. Recommends for staff in a ship of "Minotaur" class a chief, five engineers, and five artificers. 1857. Does not know anything about engineers in Merchant Service; could not venture an opinion as to social position as compared with engineers in service. 1903-1904.

JOHN A. WILKES, ENGINE-ROOM ARTIFICER.

Has served seven years in "Crocodile," "Arrow," and "Asia." 1931-1935. Messed in "Crocodile" on lower troop deck; a stoker messed with and cleaned mess; other chief petty officers messed under mess deck. 1936-1944. Kept stokehold watch in "Crocodile"; has only kept watch in engine-room in "Arrow" has certificate stating capability to do so. 1946-1956. Age on entry 24½ years; was a boy in Portsmouth factory, and served there nine years; is a boiler-maker by trade, but has worked at the lathe. 1957-1966. Had 5s. a-day in factory; entered as artificer on account of reductions; is married. 1969-1974. Was disappointed on finding what service was like; thinks it would be better if artificers were not rated as chief petty officers; would like to be made more comfortable, and have mess place close to engine-room; when had leave from chief engineer could not go, as master-at-arms would say there was not leave given; at other times detained by duties. 1975-1981. Will take labour at end of ten years to better market if he can find it; though he may not get so much pay, will not have to work on Sundays. 1982-1991. If pay were increased would rather remain in service; thinks position ought to be improved; gets pension after 20 years' service. 1992-1996. Believes a few have purchased discharge; remembers one whose friends bought him out. 1997-2001. If more were wanted, could be obtained from Government yards, by offering more money to start with; men do not think about their receiving pay for seven days or rations, and there is overtime in the factory. 2002-2006. Believes if he went back to factory would be as good as he ever was; engine-room artificers are better workmen than the engineer students; in "Volcano" artificers worked longer than the engineers. 2007-2011. Many are willing to enter; advantages are known in North through trade society; belonged to trades' union; left two years after joining service, contributions not being reduced; Navy provides all advantages of a society, but you are away from home. 2012-2022. Paid man on board ship 4s. a-month for scrubbing hammock and washing clothes, and about £1 a-month for extra rations; fault was found if hammocks were not scrubbed properly. 2023-2028. Satisfied with uniform, except jacket, in which you feel the cold when going on shore from engine room; would like a frock coat. 2029-2033. Pay should commence at 5s. 6d., and go to 7s. 6d. at end of ten years; good pay and treatment would be more valued than rank and position; master-at-arms ought not to interfere with; would like to be more under chief engineer. 2031-2039. As a boiler-maker examined "Crocodile's" boilers and did repairs, except when ship was under repair in dockyard; did not clean engines, only used tools; found some tools, but generally they were made on board ship and left there. 2040-2048. Thought to leave service after first 12 months, but after getting uniform went on; pension is an inducement to join. 2049-2050. Advantages of permanent employment, pension, pay for seven day a week during sickness and leave, rations, medical attendance and a little higher pay than on shore, have to be weighed against disadvantages of leaving home and going to sea; leave sometimes very slight; has known men who have been away almost five years. 2050-2057. Has a younger brother a boiler-maker in Peninsular and Oriental Company, who received £13 a-month on home station; had a respectable uniform, a cabin and a servant; he passed Board of Trade examination; went out to Calcutta, and then had £25 a-month; had served same time, and at same place as boiler-maker as

himself; he kept stokehold watch in "Mooltan"; she had a chief, five engineers, and a boiler-maker; repairs of P. and O. ships are done at Southampton or Calcutta. 2057-2067. Has heard no complaints about messing and inspection of artificers. 2068-2069. Contributed 4s. a-month to trade union; is a plater and angle-iron smith. 2070-2072. There would be difficulty in getting artificers at present rate of pay; thinks if wages corresponding to those on shore were given and other circumstances, such as cleaning mess, &c., were considered, there would be none. 2073-2075. Did not clean mess in "Crocodile," stoker did; in "Serapis" artificers did not; in "Jumna" they did, and in "Euphrates" took turns with other chief petty officers. 2076-2080. In Mediterranean Squadron in some ships they cleaned mess; in others some one was told off to do it; were not contented, wished a separate mess away from ship's company if possible; chest now allowed is not large enough. 2081-2094. If remains for 20 years in service and retained pay, and time would like a spell of work in dockyard. 2094. Was taught watch keeping in stokehold by engineers; found out what to do in engine-room by looking on. 2095-2097. Would rather have a chest, one 3ft. 4in. by 2ft. by 2ft. none too big; has no locker or bag besides. 2098-2099.

CHARLES ICELY, ESQ., INSPECTOR OF MACHINERY Afloat, R.N.

Engineer Students.—With additions and the removal of some demoralising influences during training, education is good both practically and theoretically. 2168-2169. Entry is by competitive examination, anybody can present himself; does not think it a good system; suggests nomination to supersede; and it might be made a condition that future students should receive no emolument for the first three years, this would go far to insure boys of higher social pretensions presenting themselves. 2170-2175, 2222. Changes in treatment suggested, if men of a higher social position are introduced; practical education to be supervised by a naval engineer; a lavatory for; sufficient time allowed to wash hands and change clothes before leaving yard; separate water closets; and to sign a book instead of lodging tickets; lectures on steam engine to be given once a-week; practical efficiency to be made of equal importance with theoretical attainments; and on entry in navy to be appointed immediately to sea-going ships, and serve twelve months before taking charge of a watch; marriage should be a disqualification for entry. 2176-2178. Is aware are examined every year in practical engineering, papers are sent from the Admiralty, but if they have no instruction it is very difficult for them to answer the questions. 2179-2182. Regulations of two years ago for practical instruction of have certainly improved, but desirable an officer should supervise, not an artificer. 2183-2184. Has not examined on entry to service; recommendations previously made are necessary to enable students being obtained from a higher social class; can hardly say whether present regulations in dockyards result from their coming from same class as workmen, high standard of education required deserves better things; mention case to show how hardly present system of open competition bears on old officers; thinks boys are crammed for examination, it is a difficult one. 2185-2189.

Engineer Officers.—Staff in "Devastation," a chief and ten engineers; was not in charge as he was promoted before the chief he was to succeed had retired; does not think it desirable in any case to have two chief engineers in a ship. 2108-2111. Was 17 years a chief engineer, and 29 years of age when promoted just after Crimean War, when promotion was rapid; brought up as an engineer boy partly in factory and partly afloat; in 1847 joined as assistant engineer. 2112-2117. Could not have retired as a chief engineer before promotion; if had been able to should have lost nearly five years' junior time which is not allowed to count. 2118-2123. Had about 12 months' half-pay as chief engineer, rate first time 5s. a-day, 14s. the second. 2124-2127. Thinks promotion of engineers is very unsatisfactory; to improve would allow to retire at 40 on maximum, conditionally on forming a reserve in case of war; does not know how many would have option of retiring at 40. 2128-2133. Would permanently reduce number; fewer engineers and more engine-room artificers could be employed with advantage; four engineers and six engine-room artificers would do for "Hotspur"; sea-going experience with young engineers limited; from what he has seen in steam reserve considers young engineers fully equal as workmen to engine-room artificers. 2134-2137. Thinks young engineers are fairly paid for the first twelve months; would make pay progressive after that;

abolish ranks of 1st and 2nd assistant, having only engineers and assistant engineers, the latter to be one year on probation, and then have 7s. 6d. a-day, progressing up to ten years to 10s. a-day, after that to 12s. a-day. 2190-2192, 2200. Should be promoted to chief between 30 and 40, the nearer 30 the better; would give 14s. a-day on promotion; one great drawback at the present rate of promotion is serving the 11 years to count time for maximum pay. 2193-2195. Is rather diffident about making remarks on pay of inspectors of machinery; thinks it inconsistent a man should lose by promotion; if had remained in "Devastation" as chief, would be receiving same pay, and time would have been counting for retirement. 2196-2199. All necessary advantage in promoting men might be met by the two classes proposed; making increase of pay depend upon character of men and their passing for each step. 2201-2204. Promotion to chief engineer by selection partly would be an advantage, with a reservation as regards special services. 2205. Thinks young engineers educated at expense of State should be bound by a pecuniary bond to serve. 2206-2209. Would be an advantage and boon to abolish engineers' mess; fact of messing alone tends to demoralise to a certain extent; if social status were raised by nomination there would be no difficulty in abolishing mess. 2210-2211. Advantage to tone of would result if could be established in a building to reside and mess in dockyard, and a great benefit if a mess for engineers in reserve could be combined. 2212-2213. If number be reduced proportion of engineers and assistants to chief engineers should be about $3\frac{1}{2}$ to 1; for "Devastation" with reduced number, proposes six engineers and nine artificers; engineers to be essentially officers of the watch. 2215-2218. To reduce number would allow chief engineers to retire at 50, count all their junior time, maximum retirement to be £400 a-year; engineers at 40 optionally, on condition of their serving in the reserve if called on; under a system of competition for chief engineer, those who did not succeed would be glad to accept retirement; it is possible with competitive examination for officers of 35 a valuable class might be lost. 2223-2228. Five years' junior time if allowed to count would make £50 difference in present retirement, it was third class time; being abroad in 1847, and not being able to be examined for new rank the cause of having so much. 2229-2231. Thinks if number were reduced and engine-room artificers appointed, manual labour on part of engineer officers might be dispensed with, except in cases of emergency; thinks, speaking from his own impressions, that the chief engineer of a small ship would object to take his turn in keeping a watch. 2232-2234. Engineers of 40 years of age not qualified for promotion, if offered £100 a-year would not accept it so generally as with an inducement in addition to retire; should offer engineers of 40 the present maximum; thinks would readily accept on the understanding that if Admiralty required their services they would be bound to serve, provided health allowed. 2235-2238.

Engine-Room Artificers.—Generally well qualified for position; fitter most useful, then a boiler maker; has not seen a fitter do coppersmith's work, his being able to do it would depend where he was trained. 2138-2141. Can speak of two cases where boiler-makers showed a special aptitude for any branch of work. 2142. Has not seen keep a watch in stokehold; doubts expediency of permitting to keep watch in engine-room of a small vessel; exigencies of service require them to keep watch in engine-room in vessels having only two engineers, but they would be directly under supervision of engineer; it is a question of responsibility; is it expedient valuable machinery should be put in charge of an artificer when he has comparatively nothing to lose? 2143-2148. Pay satisfactory up to a certain point; thinks it enables us to get good men to enter, but would make it progressive up to 7s. a-day after ten years' service to induce them to remain; would extend formation of reserve to engine-room artificers, and give additional pension to them, conditionally on serving when called on in case of need. 2149-2152. Plan of employing in dockyards on understanding that after three years they were liable to go to sea again, a very good one; would extend system of reserve by giving directions that stoker mechanics should be employed to assist in care and management of machinery when at work at sea; they would gain experience, and in case of need might take artificers' places. 2153-2154. A more healthy tone would be given if outside talent were introduced, but a portion might be trained in factories; those from outside would have larger experience in general work. 2155-2157. They complain they are not accepted in the right spirit, the chief petty officers with whom they rank are better recognised; that in their mess arrangements, they have to perform menial duties

which are detrimental to arrangements of the engine-room, that they do not have chests of the same dimensions as their brother officer, the master at arms, and also of the want of mess attendant. 2158-2162. Thinks in "Hotspur," had a boy in early part of commission to attend on them, his being taken away was a source of grievance. 2163. Complain they have not same uniform as those of relative position, aspire to a single-breasted frock coat; possible as regards grievances they look at petty officers who are a little better off not to vast number of officers who are worse off. 2164-2167.

In General.—Is an inspector of machinery afloat on half-pay; served before promotion in "Devastation" one month, "Hotspur" three years, and before that in "Donegal" and "Caledonia." 2100-2106. Had in "Hotspur" six engineers and three engine-room artificers. 2107. Has not been thrown intimately in contact with engineers of mercantile navy. 2214. In "Devastation" an engineer had charge of double-bottoms, he combined that with other duties; in "Hotspur" a senior engineer was responsible to him for double-bottoms, and he also had charge of cocks and valves; thinks it advisable there should be always an engineer in charge of all that part of a ship. 2219-2221.

RICHARD H. SLEEMAN, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Has heard are not so competent in many cases as they should be, especially as regards mechanical abilities; thinks artificers would turn out a job of work better; has seen on board ship; cannot say work they have done was satisfactory. 2274-2280. Not desirable should be selected by competition only; would wish very much indeed to see candidates nominated by Admiralty. 2314-2316. Thinks then men would be obtained of higher social standing, and engineers' mess might be abolished; suggests should not receive pay for first three or four years, better class would then be introduced; naval officers would be glad to send sons as, but now hold aloof on account of companions with whom they would have to associate. 2317-2319. Not desirable boys of Greenwich Hospital School should compete, considering source from which they are drawn. 2320. Are inclined to run wild at dockyards; thinks they marry much too young. 2337.

Engineer Officers.—System of promotion not at all satisfactory; suggests reduction in number to improve; would replace engineers by qualified artificers; in "Royal Alfred" four engineers and four artificers would be ample for engine-room. 2281-2285. If number were reduced to enable young engineers to obtain knowledge of handling engines, would send to sea on first joining in large ships, troop ships and in channel squadron to keep watch in engine-room; should be examined on duties of engine-room before confirmation. 2286-2289. To reduce list would induce those at top of, who have not passed, to go by giving better retirement, 6d. a-day for each year served. 2290-2293. Maximum pension is £130; cannot say whether engineers of 40 years and upwards would accept if allowed to retire on; some who have not passed might. 2294-2296. When retired would go into mercantile marine or get situations on shore; with families could not exist on £130 a-year with comfort. 2297-2298. Thinks half-pay of engineers is 5s. 6d. a-day, with 1s. 6d. for provisions, cannot go away from reserves like chief engineers. 2299. Has been sixteen years a chief engineer and not on half-pay at all. 2300-2301. Would not be to his advantage to be promoted to inspector of machinery with list as at present, two being unemployed. 2302. Thinks promotion would be expedited by offering engineers at top of list and over 40 advantageous retirement; several chief engineers over 50 years of age would go at once if junior time were allowed. 2303-2304. Present rate of pay very small indeed; recommends engineers or assistants, whichever they may be called, should commence on 7s. 6d. or 8s. and go to 14s. a-day; no engineer should be promoted to chief engineer after 40 years of age; chief engineers should start at 16s. or 17s., and go to 25s. or 26s. a-day. 2305-2310. Thinks is reasonable that on entry should receive 7s. 6d. a-day; although have been educated at Government expense and there being a large number of applications for entry; value of 7s. 6d. a-day at present time is very little. 2311-2312. Engineers' mess a mistake; hopes yet to see day when it will be abolished and engineers mix with other officers. 2313. Thinks if raised from a different source and service were made more attractive, bond might be done away with. 2321-2322. Messed in "Alberta" by themselves. 2323. Considers majority of young engineers are better behaved

as officers than formerly; has a partiality for their being more under discipline; might be put under discipline at a depot, are inclined to run a little wild at dockyards; marry too young. 2334-2336. Scheme in "case of the naval engineers" would cost between £50,000 and £60,000 for first year, not so much afterwards, includes £12,000 saving by abolishing engineers' mess, but portion of this must be taken off for additional expense to gun-room mess. 2338-2345. Advocates doing away with ranks of first and second assistants, fewer denominations being better understood; ranks remaining sufficient as steps for promotion. 2346-2349. In drawing up suggestions as to pay medical branch principally consulted; it was taken into consideration that surgeons had to pay for an expensive education, while engineers were educated at expense of the country, but value and responsibility of the latter are very great when in charge of large ships; though pay of lieutenant, who has equal and almost greater responsibility is exceeded, he gets promotion earlier and has prospect of a flag. 2350-2357. Thinks several of present engineers could be introduced into gun and ward-room messes; rather against the young married men; would not make compulsory, introduction of better class of students would meet that. 2358-2361. Increasing chief engineers and employing in all vessels of 700 indicated horse-power, and offering a little more pension to engineers, would reduce number; if engineers were not promoted after 40 many would take increase and go. 2362-2369. Would make engineers rank with sub-lieutenants after probation of twelve months at sea. 2369-2370. A ship of 800 indicated horse-power should have a chief engineer, one assistant and two engine-room artificers; engineer and artificers would take watches; if engineer fell sick, does not think chief would object to take watch; if number is reduced you must have undeniable good men as engine-room artificers. 2371-2374. Thinks chief engineers recently promoted would rather be appointed to a ship to take watch occasionally than remain on half-pay of 6s. a-day, which is deplorably bad. 2375. "The case of the naval engineers" represents views of majority; was drawn up at Portsmouth, after conference with officers at Plymouth and Sheerness; does not think engineers expected all it contained, but no doubt they are underpaid. 2376-2379. If engineers were retired at 35 or 40 would be desirable to have retainers on in event of war, might be employed up to 50, engine-room artificers and stokers might also be retained for reserve. 2380-2382.

Engine-Room Artificers.—None in "Alberta," had one in "Royal Alfred," an exceptionally good man; brought up in fitting shop in private trade, had served two years previously in "Phoebe," thinks is in service still. 2247-2255. Those at present obtained from outside and dockyards not what they should be, fall short of work they profess to know. 2256-2259. Not so much wages as treatment which prevents our getting good men; should have separate mess, and someone to clean it and scrub hammocks; too much under control of and feel interference of master-at-arms. 2260-2265. In "Royal Alfred" artificer kept stokehold watch very well; he came from private trade. 2268-2269. Would give separate mess; in "Sultan" have small mess place in one of the flats berthed off, are comfortable and satisfied. 2324-2327. Considers progressive pay and better messing arrangements would be more popular than giving a portion rank of warrant officer, and elevating to that rank would not be conducive to comfort of service. 2327. Want as uniform single-breasted frock coat instead of short jacket. 2328. Thinks little better treatment, increase of pay, to be more under supervision of engineers, together with pension, would induce to re-entry after ten years' service, and good men to enter. 2329-2330. Considers might receive 5s. 6d. to 6s. a-day on entry, and go to 7s. 6d. or 8s. a-day after ten years' service. 2331-2333.

In General.—Is chief engineer of "Alberta"; served previously in "Vixen," "Penelope," "Assurance," and "Royal Alfred"; "Alberta" has two engineers. 2338-2346, 2366-2367. Entered service as engineer apprentice in 1842; first served in "Volcano," "Eclair" and "Rattler"; then went to depot at Woolwich. 2271-2272.

CAPTAIN THOMAS BRANDRETH, R.N.

Engineer Students.—Enter by competition, are not selected except by; would wish to see candidates nominated by Board of Admiralty; there is not selection enough. 2391-2394. Believes practical training is not considered sufficient, particularly in case of those who study for two years at Greenwich. 2396-2398.

Engineer Officers.—Has proposed that staff of should be reduced, and places taken by engine-room artificers; advantages reducing number, allowing others to come on for promotion, and most likely entering a superior class. 2387-2388. Could not say whether young engineers or engine-room artificers are the better workmen. 2389-2390. If number were reduced and higher class entered, engineers' mess might be abolished. 2395. In event of war supposes increased number could be obtained from merchant service by pay for a temporary period. 2414. Promotion very slow, thinks age of 43 is too old for men to be promoted to rank of chief engineer. 2420-2421. If chief engineers were appointed by actual horse-power more might be employed and promotion expedited; chief engineer should keep watch in a small ship if not sufficient engineers or qualified artificers to do so. 2422-2424. Has not thought about improvement in pensions; not well acquainted with regulations. 2425-2426. Does not think messing or sleeping are objectionable; have bath-room. 2427-2429. Would enter some from general trade of country; thinks there ought to be a distinct understanding about their doing practical work, in some ships they do it, in some not; believes ought to understand and do. 2430. Those entered from private trade should pass same examination as engineer students; believes a certain number would enter at same rate of pay as own engineers, though they had to bear expense of training and education while engineer student do not. 2431-2432. Bunks objectionable; considers there is not room enough in a ship to allow senior engineers cabins. 2440. Maximum pay of 10s. a-day ought to be increased after twelve or fourteen years' service as engineer; considers as a rule should be promoted to chief engineers at about 35 years of age. 2441-2442. Thinks pay of inspector of machinery ought to increase with length of service; £20 a-year to about £600 a-year; it is possible for a chief engineer with extra allowances to get more pay than; title of inspector of machinery quite satisfactory. 2454-2460. One class of assistant engineers sufficient, second class an objectionable term. 2461.

Engine-Room Artificers.—Messing in "Lord Warden" at one time with chief petty officers, which did not work well; latterly with master-at-arms; first arrangement complained of by artificers, they not being in mess allowed by regulations; had to clean out mess, less in second instance; had boy to attend on them in both instances. 2399-2407. Believes if desirable to increase number there would be no difficulty in obtaining at present rate of pay; advisable after certain service to increase pay, would rather give than increased position. 2408-2410. Has been out of the way of hearing complaints about pay, position, and treatment; there were no complaints in "Lord Warden," but she was a flag ship, and artificers were very good. 2411. Should prefer their having a distinct mess and standing of their own, chief petty officers consider they have jumped to their rank without serving for it. 2412-2413. Thinks would be an inducement to join service if after ten years at sea were allowed to work in factories on pay they received, on understanding they were to go to sea when required. 2415-2416. Reason why armourers cannot be obtained is perhaps because they are merged into engine-room artificers; thinks best of them quite equal to engine-room artificers. 2416-2418. No instance of an artificer keeping watch in engine-room has come under his notice. 2419. Mustered as chief petty officers in "Lord Warden"; fell in opposite stokers; stokers were under engineers, who kept divisions and attended to clothes. 2433-2436. Were on same footing as regards leave as other chief petty officers; did object to go to master-at-arms, thinks objection was frivolous. 2437-2439. Understands they come from Glasgow and Liverpool; when notice was given there that men were wanted, number required was filled up in a very short time, more than enough came. 2443-2445. Thinks if pay were increased would remain in service after ten years have expired; would not wish to see raised to warrant officers; difficulties about messing and cabins. 2446-2447. Would be good to have an engineer officer travelling about to obtain best men for service. 2448. Dress satisfactory, no objection to having tunic if it gave satisfaction. 2449-2450. Does not remember any complaint about chests in "Lord Warden"; bearing in mind their having places or lockers in engine-room, thinks should not have chest as large as that of master-at-arms. 2451-2453.

RICHARD CHAPMAN, Esq.

Is a clerk in the Admiral Superintendent's office, Portsmouth; duties have connected him with engineer-students

since their entry in 1863. 2462-2464. Everybody who applies for a nomination has a paper given him to fill up according to the instructions contained on it; does not know that any question is asked as to respectability; no objection is made on account of parentage. 2465-2467. Have guarantee or referee as to character, but no inquiry is ever made from Superintendent's office. 2468-2471-2478. Generally about thirty applications for ten vacancies. 2472. Mode of entry has been in force since 1863; has nothing to do with the students after they have been entered, or with entry of engine-room artificers, 2473-2475. Has never known a young man not of good character competing successfully; keep list of parentage of boys, it is sent to the Admiralty. 2476-2477. Always considered Civil Service Commissioners, or Admiralty would apply to referee; thinks a boy must be well educated to pass. 2479. Perhaps there is cramming for examinations; Mr. Barber is very successful with his boys, of whom many are sons of engineer officers, foremen of the yard, and tradesmen. 2480-2482.

PATRICK G. LAMBERT, Esq., Chief Engineer, R.N.

Engineer Students.—Are selected by competitive examination without reference to parentage; system not good; recommends selection as to respectability; thinks ought to be nominated by Admiralty. 2565-2571. Present training very good, has improved; not had much intercourse with students while under instruction. 2577-2579, 2581. Has had no experience of South Kensington students. 2592-2593.

Engineer Officers.—Made chief engineer at 34 years of age; engineers are now 45 to 50 when promoted; should be promoted not later than 42; would promote at 35 if had re-organising of system. 2491-2495. Promotion not satisfactory, there is none; recommends list of chief engineers be enlarged, and that they be employed in smaller ships according to indicated horse-power. 2535-2537. Thinks chief engineers would object to keep watch in small ships; would do same duty as engineers in charge of whom very few keep watch. 2538-2540. Number must be reduced by retirement, in addition to increasing chiefs, to cause satisfactory promotion; engineers at 35 would go if offered maximum retirement of £130 a-year; those at 45 would not be pleased with it. 2541-2545. Reason why engineers do not qualify for promotion is because if they did they would have to remain to 50; most have passed educational test, thinks they could pass it when over 40. 2546-2549. Aware chief engineers have declined promotion to inspector of machinery; would refuse, pay being same as a senior chief engineer's, and not equal to responsibility, and should have to serve to 55 or 60; not inclined at his age, 51, to take promotion if pay were increased. 2550-2554. Could retire, but wants to complete certain time; retirement about £360; if made inspector would possibly be on half-pay of 16s. a-day for two years. 2555-2558. Pay of engineers not satisfactory; it is on entry, but if kept to present age before promotion should rise to 14s. a-day; if promoted at 35 or 36 should depend on service; half-pay of chiefs very small; being on a grievance. 2559-2564. Very strong desire on part of engineers to be admitted to gun and ward-room messes; thinks young married men with families would go to expense of ward-room mess for sake of their position; engineers' mess is nearly as expensive, and it is assumed pay would be increased. 2572-2574. Looking to parentage and position of those now admitted, there are exceptions who could go into ward-room; if nomination were introduced, number reduced and position improved, there would be no objection. 2575-2576. A good thing if mess could be formed for young engineers in reserve. 2580. Cabins better for than hammocks. 2582. Pay of inspector of machinery not what it should be, should rise to about £600 or £650 a-year. 2583-2584. Not in favour of promotion by selection; nine-tenths are qualified if promoted in time; difficult to get at best men by selection, and it makes others dissatisfied; reports on trustworthy only as regards conduct; it would be wrong to shut door against merit entirely. 2585-2591. Great grievances want of pay and position; there are great complaints at not counting all time; loses five years himself, his third class time. 2605-2612. Proportion of engineers to chiefs to cause a sufficient flow of promotion should be about 450 to 210 or 220. 2613. Knows nothing about engineers of mercantile marine, has met; thinks are not entered from higher class socially than engineers now entered in service, only better class of become chief engineers. 2614-2616. Only objectionable part in "case of naval engineers" it begins too high for students, and whole scale might be reduced; thinks in

laying down pay rate of other ranks was consulted; case received general assent of majority of engineer officers. 2618-2620, 2623-2626. Would be satisfied if pay were raised in same way and under same scale as other ranks in service, taking into consideration are educated at expense of State, and different ages at which different ranks are attained. 2621. In case of war would bring back all who have retired until they arrive at compulsory age. 2627-2628. Would have to go to manufacturing districts for in case of war; should be entered temporarily and paid accordingly; retention of temporary service men after Russian war upset system, and caused dissatisfaction. 2629-2632. Proposed to give 6d. a-day for each year's service to induce engineers at top of list to go; maximum £180 to £200 for over 20 years' service, thinks all of 40 years of age would go on that. 2651-2653. Considers rank of chief inspector of machinery should carry pay, and not be merely honorary. 2654-2656. Thinks complaint of want of pay is well founded; scale in any rank should be based on service, and in proportion to performance and nature of duties. 2657-2659. Although services of any number of present class can be obtained, pay should be increased to keep skill, are more valuable after serving a considerable time. 2660-2661. Young engineers did not know pay they would receive, time before promotion when they joined being eight or nine years, and it is now over 20; a tenth cannot become chief engineers; engineers would like a step in rank on retirement, and to be retired not pensioned. 2662-2667.

Engine-Room Artificers.—Not satisfied with in "Lord Warden"; fitter and boilermaker tolerably good; blacksmith of no use at all. 2496-2502. Would be good for service to increase and decrease engineers; if engineers were reduced could keep watch in stokehold of large ship under superintendence of engineer of watch. 2503-2504. In small ships have taken charge of engines; thinks give satisfaction; no objection to one of a certain standing who had passed examination keeping watch in engine-room. 2505-2506. Thinks would be material difficulty in getting increased number at present rate of pay; cannot now get good ones; fitters and boilermakers as a rule trustworthy men; blacksmiths are rough. 2507-2510. Recommends should be fitters, boilermakers or copper-smiths, not blacksmiths. 2511-2512. Would offer better pay to get better men; 5s. 6d. for first few years, then progressive pay, and something to go on for the 20 years; ought to have probation in dockyard to ascertain qualifications. 2513-2517. Messing very faulty; never messed in proper place with master-at-arms, and other chief petty officers; in "Volage," had mess of their own with the tailors and shoemakers. 2518-2522. Does not know they wish for any particular place to mess in; would prefer messing by themselves; there is jealousy with regard to master-at-arms, and were always before lieutenant, mess not clean, and they said they had no time to clean it. 2523-2525. No doubt messing and other arrangements would be simplified if under chief engineer. 2526. Slight progressive pay and good treatment as regards messing would ensure getting good men. 2527. Are more useful than young engineers as workmen; can be put to different kinds of work you cannot put officers to, and be kept working all day; leading stokers help when artificers are sea sick. 2528-2531. Had better have coats; does not know where tunic ends and frock coat begins, if had former would soon go into latter; pea jacket not dressy enough for them. 2532-2534. Pay should be from 5s. 6d. to 7s. 6d. a-day; would re-enter after 10 years' service, but best men would leave; pension very small, wants modifying; is about £45 or £50; ought to have more if good men. 2594-2598. Might be employed in steam reserve workshops; afraid would acquire bad habits in factories, and get into dockyard step again; work the same as that of factory men, but do twice as much. 2600-2602. If both were equally trained as skilled artificers would take engine-room artificer before factory man, the former get into better system, and give an honest day's work. 2603-2604. Recommends should be confined to engine fitters and boilermakers, with a few copper-smiths; boilermakers to be angle-iron smiths; no blacksmiths. 2633-2637. Would not give rank beyond chief petty officer; does not approve of their being made warrant officers. 2638-2639. Clash with master-at-arms, at first believes on account of badge on cap, and have always had difficulty about cleanliness of mess. 2640-2641. Relative rank necessary on account of prize money or anything of the sort; if messed with master-at-arms there would be no difficulty, because his mess is always clean. 2642-2647. Never cleaned mess in "Lord Warden," because were always at work, ought not as chief petty officers to be expected to clean; should have hammock-man. 2648-2649. By giving mess place, servant,

and putting under chief engineer, thinks everything would go straight; as regards leave might be taken from master-at-arms, who will not allow them to go when chief engineer can spare. 2650-2651.

In General.—Serving in "Lord Warden," has been to sea in her; complement a chief, five engineers, and three artificers; engineers were all old men. 2483-2487. Chief engineer since 1859; entered service in 1846 as third engineer. 2488-2489. No double bottom in "Lord Warden"; in "Volage" in compartments, double-bottom under screw alley. 2617.

MR. GEORGE J. WEEKS, ENGINEER, R.N.

Engineer Students.—Has heard making remarks about their position, alterations required are local; their training is bad; practical workmanship not encouraged; would give marks for practical attainments. 2732-2734. Not aware of change of system in last two years; speaks more of his own experience; was an engineer boy; attended school; it was voluntary. 2735-2738. Educated at upper school at Greenwich; went from there as engineer boy; passed second out of 40; was told he had made a mistake, has since found it to be the case, schoolfellows being now paymasters, staff commanders, and first lieutenants. 2739-2741. Are often sons of artificers and labourers in dockyards; student, as such, in many cases ignores friends and relations, seeks another home, gets a wife, but she unfortunately is as a rule from similar connections. 2756.

Engineer Officers.—Considers age for promotion to chief engineer too old, his own, 32, the most suitable; has been senior in one ship, and afterwards junior in another, thinks no other class is served in same way; knows difficulty with engineers is very great; has been 12½ years in service, passed examinations, and there are now 330 before him for promotion. 2673-2675. Has no prospect of being made a chief engineer; promotion getting decidedly slower. 2676-2677. Pay should be progressive; would limit age for promotion to chief engineers; engineer not promoted on account of age to have same pay as a junior chief engineer, not less than 14s. a-day. 2678-2679. Cannot imagine promotion by selection for engineers; present test is the educational certificate; thinks a man who has misbehaved should be passed over. 2680-2683. Suggests reduction in number to expedite promotion to chief engineer; a large portion of work on board ships could be done by artificers holding position, and having less pay. 2684-2685. Would reduce number of engineers by restricting age of promotion to 40; allowing retirement at that age; a man should not be promoted to chief after 32 or 33. 2686-2688. About 68 engineers would be retired by compulsion at 40 years of age; to induce to retire voluntarily at 48, those not qualified for promotion should receive 6d. a-day for each year's service, those qualified should be allowed to assume rank of chief, and retire on same scale. 2689-2691. Thinks 6d. a-day for each year's service would induce men to leave; service to be all service, whether sea or harbour. 2692-2695. Work in harbour should be different from that of an engine-room artificer; should be employed profitably, on such ships as "Inflexible," watching building; knowledge obtained could be utilised hereafter. 2696-2701. Does not consider an engineer should be only a mechanic, requires to be something more; has to know whole of the trades in profession, an engine-room artificer only his own; amount of talent among engineers could be utilised in various ways; taking extreme case of "Vanguard," considers raising her an engineering question, and it is of a kind that requires to be cultivated for the good of the country. 2702. Class of men at present entered not the best that could be obtained, the root of the evil; should be nominated like other officers, thinks if they were sufficient candidates could be obtained; is only branch not courted, and in which candidates are bound to serve for a certain time. 2703-2705. Country has a right to insist on a young man serving after his receiving his education at its expense; more advantageous to make position one to aspire to than one to throw off; should pay for education if they do not serve. 2706-2712. After educating men gratuitously, thinks it would be a hardship if Government were to discharge suddenly. 2713-2717. Does not know in what service those retired at 40 would earn livelihood; native town or country would settle; there is a large field open in England for. 2718. Pay on entry small; recommends 7s. 6d. 2719-2720. Knows nothing about "case of the naval engineers"; agrees with it all but the high scale of pay; does not belong to the club. 2721-2725. Had a

little acquaintance in China with engineers of mercantile marine; an engineer who failed to pass doctor for service is now chief engineer of a large steamer, and informed him his salary was £300 a-year, and was doubled by allowances; in a short time savings would allow him to retire on a competency; could not have done this in service, as his pension would have been only £72 a-year. 2726-2727. Thinks if engineers were allowed to retire could find employment in mercantile marine to any extent. 2728. Present rate of retirement for chief engineers very satisfactory if junior time were allowed; on attaining relative rank of commander might be allowed to add £10 for each year's service; thinks a number of engineers over 40 would accept maximum of £130 to retire. 2729-2730. Considers would be satisfied if were placed on same footing as other officers as regards pay and retirement; chief engineers being promoted earlier. 2750. Would do away with engineers' mess; often the cause of turning a well-conducted able officer into an intemperate one on account of his seclusion. 2751-2752. Would be desirable to do away with engineers' mess at once in small ships, not in large ships, too many engineers in at present; young married engineers could not enter ward or gun-room messes on present rate of pay. 2753-2755. Engineer service is not popular; when he entered engineers were promoted to chief engineers after about 10 to 12 years' service; has now 14 years' service, and is 330 down list; considers seniority entitles him to something better to do than when he first joined. 2757-2758. Would be an advantage and only just to appoint chief engineers to smaller ships. 2759-2761.

Engine-Room Artificers.—Has not been shipmate with; experience has been with regard to qualifications for entry; on one occasion two fitters, likely men, on being told pay was 5s. a-day for seven days in the week, rising to 5s. 9d., replied we are getting 6s. a-day now, and went away; another man, a blacksmith, getting 24s. a-week was only too ready to join, but was useless. 2731-2742. Will not re-enter for another ten years; pay ought to be increased and progressive to 7s. 6d. a-day after 10 years' service; should begin at 5s. 6d. a-day. 2743-2747; does not think rank they hold induces them to enter or has any effect upon them. 2748-2749.

In General.—Is an engineer; last served at sea in "Salamis"; part of the time as acting chief engineer; had no engine-room artificers. 2668-2672.

WILLIAM G. H. BATEMAN, ENGINE-ROOM ARTIFICER.

Is serving in steam reserve workshop; joined service, 1864; became an engine-room artificer in 1868; was then a chief stoker. 2762-2766, 2772-2774. Trade fitter and turner; learned it in about six years at London and North-Western Railway. 2768-2771. Received 4s. 6d. as chief stoker; entered at 28 years of age from Sheerness Yard, was there four and a-half years, and received 34s. a-week; after completing time at railway, went to small arms' factory, Enfield, after a fortnight on 30s., had 34s. a-week. 2775-2784. Family affairs induced to go to sea as chief stoker; is married; went to sea as chief stoker in "Achilles"; as engine-room artificer in "Caledonia" and "Victor Emanuel." 2785-2789. Kept watch at sea in engine-room of "Achilles," has a certificate as to capability, did duty in starting and stopping engines. 2790-2797. Is receiving 5s. 9d. a-day; time for continuous service dates twelve months after entry as chief stoker; has completed ten years' service and re-entered; knows another artificer, a fitter, who has re-entered. 2798-2805. Eleven artificers are working with, three fitters, remainder blacksmiths and boiler-makers. As a rule, a good blacksmith would get as much as a good fitter, but as in a factory there would not be sufficient fires to keep first-class smiths on 6s. a-day, blacksmiths do not get as much. Hardly quite fair to ask him if a blacksmith is of same value in engine-room as a fitter. 2806-2809. A blacksmith is at forge work in the engine-room, but as there is a lot of boiler-maker's work, he has to turn to that; has never found many boiler-makers turn to fitting work. 2810-2813. As a rule, artificers are good men; there are some really not worth their pay, not the men's fault, but the fault of the pay given; can not say they have not been properly examined, but they prove inefficient. 2814-2816. A far better class as mechanics would be willing to join from dockyards and private trade provided they could get better pay. 2817-2819. Could earn 6s. a-day in private trade; it would be for only six days a-week, but should have evenings and Sundays at home without work; is at home on Sundays now, but it

is not always the case, considers a spell in steam reserve a privilege. 2820-2824. Uniform is not sufficient to keep warm; has a pea-jacket, but can be told by captain to take it off; the uniform jacket is a short reefer, or monkey-jacket with uniform buttons. 2825-2830. Wish a mess by themselves in any convenient part away from stokers and ship's company; not with master-at-arms, nor with chief petty officers, cannot do as they do in way of cleaning mess and cooking. 2831-2835. Wish for somebody to clean mess; might as well mess with the stokers as the stokers' mechanics who come in as stokers and have not served their time at a trade. 2836-2841. Blacksmiths would be received as engine-room artificers; does not think many would pass. 2842-2846. Think pay should be raised after ten years; believes artificers would be willing to work in factories after certain service on pay they had earned, and go to sea at any time if emergency necessitated it; time served in reserves depends on inspector of machinery, who endeavours to keep a valuable man. 2847-2851. Pension at end of ten years the same as a first-class petty officer's, the highest, £52 a-year. 2852. Belonged to a trades union, but left it; the only thing that it does do that the Government does not do is to provide for family in case of anything happening, but it also gives a pension. 2853-2860. Paid trades union 4s. a-month; does not insure life; no objection to sea life. 2861-2863. Has always been allowed large-size chest, but bought small one. 2864-2870. Allowed when in reserve 7s. 7d. a-week to provide lodgings, provisions, and fuel; there are boats' crews getting 1s. 6d. a-day. 2868-2869. Thinks at end of ten years 8s. to 8s. 6d. a-day should be given to get good men; after they have been to sea are offered good appointments elsewhere; good men will not enter unless they have a better start. 2871-2874. Paid 4s. a-month for man to look after hammock; does not know pay of boiler-makers in merchant service. 2876-2877. If stoker were appointed to mess with, and clean out mess, it would not be recognized; unless a person was told off for the duty it would not answer. 2878-2879. Obtained leave in some ships by going to master-at-arms, in others by going to commanding officer after asking chief engineer; has found difficulty in obtaining leave; in "Achilles" all chief petty officers mustered with men and waited turn to go over the side; in "Caledonia" chief petty officers could go on shore two nights out of three. 2880-2886. First part of commission in "Caledonia" messed with chief petty officers, afterwards commander gave a mess to artificers; rather disagreeable to mess with chief petty officers. 2887-2889. Would have preferred messing with master-at-arms, because he can tell someone to look after his mess. 2887-2893. Position could be modified if were placed entirely under chief engineer; if they hold rank as at present are under master-at-arms, if were placed on equality, or next above him, he would not be able to order about, and they would gain more respect; master-at-arms is their superior officer, and he likes other people to know it, would have to obey him as regards police duties, even supposing were his senior. 2894-2898. Messed in "Achilles" right forward on port side of main deck; a comfortable mess place could have been made in engine-room flat, supposing marines' bags had been removed, would have preferred that position if could have had it to themselves and depended on finding meals all right. 2899-2905. Would rather be under chief engineer's orders and be separate from lower deck. 2906-2908. Would like as uniform something warmer than jacket, does not think it too much to ask for the same as master-at-arms, schoolmaster, and writer. 2909-2910.

**WILLIAM H. STEIL, Esq., R.N., CHIEF ENGINEER,
H.M. DOCKYARD, PORTSMOUTH.**

Engineer Students.—Had special charge of at Sheerness and Portsmouth; second assistant under him at Portsmouth has now special charge of, and there is a leading man to superintend work. 2918-2919. During six years training are employed in the various shops; in part of fifth year on hulls of iron ships, and in sixth year on ships afloat, in repairs, &c., and in drawing office. 2920-2923. When employed on iron shipbuilding are under directions of chief constructor; believes a leading man instructs them. 2924-2926. About 59 in dockyard; account is kept of work; earn their pay for time they are employed; first two or three years are learning. 2927-2929. Satisfied with practical training; work in dockyards chiefly repairs, better for them if they join navy, but new work would extend knowledge. 2930-2934. Thinks, as regards treatment while under training, everything which could be done is done. 2935. System of admission without selection, or

nomination, decidedly bad; proposes for first four or five years should receive no pay, last two serve afloat and receive wages; object to exclude sons of certain people now admitted, and raise social status, it would be gained if were nominated by Admiralty. 2936-2941, 3017-3020. If number were reduced and position raised desirable to have college in dockyard for them to reside and mess in. 2943-2945, 3015-3016. Examines in conjunction with captain of reserve and chief inspector of machinery; are very seldom disqualified in practical work, to prevent complaints about mechanical knowledge, are given test job in steam reserve workshops when about to join navy, none have been pronounced unfit. 2946-2950. No annual examination in practical work, it is seen every day; aware of examinations in practical engineering, would be a stimulus if marks were given for practical work. 2951-2953. Regulations of 1873 regarding practical work have had good effect, tone has improved since. 2954. Without superior class is entered not desirable to employ naval engineer to superintend; if better class be entered the officer should be of known ability and subordinate to chief engineer of dockyard. 3023-3025. Now tractable and amenable to regulations; has had great difficulties with; idling, skylarking, not keeping good time; toned down by making examples. 3026-3028.

Engineer Officers.—Decidedly desirable to reduce and to increase artificers; engineers would in better position and able to superintend mechanics in duties they now do themselves; has not gone into promotion, but sees no chance of last one ever being; if made a superior class would be no difficulty in obtaining higher class of candidates. 3007-3010. Does not think once an engineer always so; may have theoretical knowledge, but practical knowledge after being five years on shore would be rusty for a time. 3048.

Engine-Room Artificers.—No experience of in navy; record of applicants and failures would come from steam reserve; is present at examination of. 2955-2958. Large proportion come from factory; ability as workmen reported to steam reserve, and are then examined as to theoretical knowledge; strangers sent to factory, tried in shop according to trade, easily seen whether mechanics or not. 2959-2963. Those entered might be better; men calling themselves blacksmith and boiler-smith when tried have failed; does not consider blacksmith of equal value to navy as a fitter. 2964-2967. Moulders and trade boys do not enter, inducements not sufficiently good; suggests engine-room artificers be brought up in dockyard as apprentices, and put under bond; would pay them on first entry 5s. or 6s. a-day; does not think could be kept unless bound as apprentices; if bound there would be plenty of applicants for entry. 2970-2978, 3056-3059. Question of men not coming as not a money one, but of treatment on board ship. 2979-2980, 2985. No lack of applicants at Sheerness when rating was established; unable to say whether it is otherwise at Portsmouth. 2981-2982. Desirable to get from private trade as well as from dockyard factories. 2983-2984. Pay to retain after ten years should be progressively increased to about 8s. a-day; fitters and boiler-makers in yards get from 5s. to 8s. a-day; skilled labourers go from 2s. 6d. in boiler-shop, but are not men you would enter as artificers. 2986-2990. Would not be able to recommend whole of men receiving 5s. a-day in boiler-shop for entry in navy; wages in boiler-shop are raised as recommended by officers; no limit to number receiving 6s., 7s., or 8s. a-day if ability deserves. 2991-2993. Men in factory not entitled to pension; nearly all hired; thinks would be desirable to make an establishment for some portion, leading men certainly; now man who has had care of machinery and control of 300 or 400 mechanics, and the labour get same gratuity. 2994-2998. Prospect of pension an inducement to join service, and guarantee for good behaviour. 2999. Considers it would be popular with engine-room artificers to allow them after service at sea to work in dockyard on their pay, on understanding they were to go to sea on an emergency, but not with employers; would not exert themselves, and there would be no control over them; would clash with ordinary workmen; thing would not work in his opinion. 3000-3001, 3036-3047. Recommends should go to steam reserve workshop; could be profitably employed; thinks workshops quite sufficient; if so employed would take away engineers, it not being right they should work side by side. 3002-3006, 3033-3035. As regards being a benefit for a large portion, or best men in factory, to be engine-room artificers, best men are now in receipt of 8s. a-day, have opportunity of overtime, and work short hours; all the year round 6½ hours a-day. 3011-3014. Getting better men not a money question, it is their treatment, suggests

should be put under chief engineer; has not seen mess places; heard complaint about chest not being big enough. 3021-3022. Thinks with reference to training for artificers, number of trade boys in yard is quiet sufficient; is about a thirteenth of whole number employed in factory; good ones leave when they have learned trade. 3029-3031. As a rule men for factory are obtained from outside; those who remain after being trained are not the first-class men. 3032. Could employ 100 or 200 engine-room artificers profitably in factory; the difficulty would be their not complying with dockyard regulations; would not like being searched by police, there would be a little trouble at first in placing in superior position to ordinary factory men. 3049-3052. Would take armourer, who would be entered as an engine-room artificer, into factory, if he could produce his indentures; should not like every man to produce credentials; one of the best mechanics in factory was nothing but a leading stoker. 3053-3055.

In General.—Is chief engineer at Portsmouth dockyard; has had eight years' service in dockyards; was senior assistant to master shipwright, and engineer at Portsmouth; engineer of dockyard at Sheerness, and assistant inspector of machinery at Portsmouth; served as chief engineer afloat from 1861-1867. 2911-2917.

**WILLIAM T. MEAD, FITTER, H.M. DOCKYARD,
PORTSMOUTH.**

Is in charge of party of fitters; has been three years in dockyard; served time at Salisbury, and at Humphrys and Tennants, marine engineers. 3060-3065. At sea about 14 months as third engineer in merchant boat; received nine guineas a-month, and all found; left that service, having saved money and married. 3066-3074. Receives 6s. 4d. a-day in dockyard; expects rise shortly; had 6s. a-day before. 3076. Belongs to trades union; if out of work would receive 10s. a-week, support when sick, pension according to years belonged to, and £100 for accident incapacitating; widow would receive gratuity of £12; pays 9d. a-week. 3077-3083. Does not go to sea as engine-room artificer, position not good enough; more money, and a little better position required; mess berth and wash berth wanted; interference of ship's corporals and master-at-arms prevents men entering; also majority entered are boilermakers and smiths; the few fitters entered are worthless and have gone in without trial job; these men would be senior, and get any advantage to be gained. 3085-3087. Fitters would be satisfied with 6s. 6d. or 7s. a-day to rise 8s. 6d., and to be a separate class; men will not go to sea for pay on shore, have to give up comforts, and there is the risk; nothing official stated about pension. 3088-3089. Pension ought to be more than £45 or £50 a-year, given to understand after 20 years it would be £75; a lot of men under same impression; it is an inducement to enter. 3090-3095. Employment in reserve or dockyard after service at sea on same pay would be an inducement to join. 3096-3098. Would not like, if pay were increased, boilermakers and smiths going into first-class before fitters, and being their seniors; fitters are a higher class of men, and get more pay; engine fitter can begin as fifth engineer in merchant service, but once a boilermaker always a boilermaker; fitter does not benefit by entering service, boilermaker does. 3099-3107. Would have to work on Sundays for extra 6s. 6d. a-week in navy; does not consider rations, if a man had to live on thinks he would not get very fat. 3108-3112. Told to mention artificers would like a frock coat; would rather wear jacket; no reason to complain of uniform. 3113-3116. Artificers wish mess away from lower deck so as not to mix with stokers; believes can be forced to scrub, a man may be a good fitter, but no hand at scrubbing. 3817. Principal objections are, boilermakers and smiths being put on a par with fitters, pay not enough, mess arrangements not satisfactory, and interference of master-at-arms. 3118-3123. Artificers would rather be under chief engineer, and give up all relative rank. 3124-3126.

CAPTAIN CHARLES L. WADDILOVE, R.N.

Engineer Students.—Sent to factory to satisfy officers they are competent; signs certificates, but cannot say superintends work so as to be able to give opinion about it; test work done in reserve; reports of satisfactory; thinks certificates vary from very good to fair. 3129-3134. Only come under for examination. 3135. If admitted from any class of society would not consider it desirable to admit to ward and gun-room messes; entry ought to be

by nomination, might then get from higher social class, provided they saw competence and were treated in accordance with former position. 3190-3193. Believes is desirable more practical work should be taken out of 3194.

Engineer Officers.—Satisfied with ability of young engineers as workmen; compared with artificers, thinks most perfect work has been done by engineers; in later commands saw tendency amongst to give up hand work. 3138-3137. No advantage in reducing number except to give promotion; if good men were brought in prefers having larger number and not replacing by artificers; engines should always be in charge of competent engineer. 3138-3143. Inexperienced engineer taking charge of engines is under supervision until competent. 3144-3146. Cannot say whether young engineers are good boiler-makers. 3147-3148. Judging from letters and conversation thinks not altogether satisfied with position; slowness of promotion one complaint, does not see remedy for; should be promoted to chief engineer at from 30 to 40; promotion rapid during Russian War, entries large also, and stagnation has followed. 3149-3154. Thinks promotion is slow, pay small when in sea-going charge, and not progressive with rank; do not get benefit of relative rank; inspector of machinery of Channel Squadron cannot have furniture for cabin, furniture should be allowed according to relative rank; chief engineers ought to count time for retirement from time of confirmation. 3155-3158. In steam reserve workshop must work with artificer if attached to same job; believes dislike to working in factory or workshop follows on a man's qualifications. 3159-3160. Could not be given practical education equal to artificers unless had longer time to prepare. 3161. Thinks invitations addressed to "Captains and Officers" should be sent to; has always done so, and had no reason to regret. 3183-3186. To be consistent, engineers' mess should be abolished, and engineers admitted to gun or ward-room mess according to relative rank; rule regarding relative rank should apply to in same way as to all others, in giving authorities should consider what would follow. 3187-3189. Would allow engineers who could not be promoted to retire with step in rank if they had certain sea service; to count time from confirmation and to choose retirement on half-pay, or pay they were entitled to by service; could not say whether engineers of 40 years of age would go on present scale. 3203-3206. Must be prepared for accidents if engines in ships like "Hercules," "Sultan," and "Monarch" are put in charge of less qualified men than engineers. 3207. One or two cases of reluctance to do manual work complained of by chief engineer, but there was no more difficulty when it was made clear that it was to be done; should not sanction commissioned officers being put to do if could be done by artificers, juniors should be first called on for. 3218-3219. Same numbers being retained in large ships, would be required to be employed in repairs, it must be considered when they enter service. 3220-3221. Believes in large ships that there are only two in a watch practically; with reference to employment of artificers, a chief engineer could give an opinion as to assistance necessary; thinks engineers might be reduced to a small extent. 3222-3223.

Engine-Room Artificers.—Desirable workmen in engine-room should be of best character and qualifications; satisfied as a rule with way in which artificers have done work. 3162-3164. Almost impossible to get copper-smiths; fitters and good boiler-makers next most difficult; smiths easiest to obtain; in entering in reserve number in each trade not limited. 3165-3168. Pay is sufficient to attract good men from both dockyard and private trade, except first-class fitters and copper-smiths; suggested to Admiralty in 1874, when none were entering, they should be advertised for; when batch came from Liverpool found want in navy was not known, as soon as it was supplies came in from dockyard as well as from outside. 3169-3170. Chest should be same in size as that of other chief petty officers. 3170-3172. Reported in 1874 to Admiralty, suggesting measures to ensure number being kept up in the reserve, and on the cause of the difficulty in obtaining; hands in copies of the letters. 3172. Desirable master-at-arms, executive chief petty officers, and engine-room artificers, should mess together, in "Inconstant" when they settled into that never had another squabble; a couple of boys allowed for the mess, ship's cook cooked for them with such assistance as men chose to give. 3173-3175. Messing with master-at-arms would remove complaint about cleaning mess; with regard to leave thinks it probable master-at-arms assumes right of giving instead of being means of forwarding request to commanding officer. 3176-3177. Occasions very few on which master-

at-arms and executive chief petty officers need object to artificers coming into mess in dirty clothes. 3178. Objectionable to put to mess on engine-room flat, ventilation bad and heat great, and would be a step to claim a better place. 3179. In "Monarch" all chief petty officers, including master-at-arms, have a very good mess in after part of starboard side of lower deck; whatever fitting for messing for chief petty officers may be it should be universal for the fleet. 3180-3183. On entry pass slight examination in arithmetic and reading, are asked questions to ascertain knowledge of engine, cocks and valves, and are sent to factory to do a job of work, all from Liverpool passed; thinks entry of all under term engine-room artificer a mistake, wages should vary. 3196-3197. Would limit to, and enter as fitters, boiler-makers, copper-smiths, and engine-smiths, reserving rating of engine-room artificer as something equivalent to warrant officer; some such prize should be within reach of limited number, to be given only after long service, they might then remain for work in reserve; to mess with warrant officers if given rank. 3198-3199. Would very likely care more for increase of pay than rank; if entered under trade and paid sufficiently sees no reason why they should be chief petty officers. 3201. Trades are considered when sending to ships; every large ship ought to have a fitter, boiler-maker, and copper-smith, to do so wages of the latter would have to be increased. 3202. If an engine fitter had attended trials and to working of engines, he would be as competent to manage as a young engineer on first going to sea, but believes large proportion of fitters have no knowledge of driving or taking charge of an engine. 3208. Probably artificers keep watch in small ships after they have been some time at sea; as soon as they get into habit of doing will claim position as engineers. 3209. An engineer officer might be frequently sent round manufacturing districts to select good men, but object would be equally gained by entering men at the district ships; captains of steam reserves might be authorised to communicate with captains of district ships and recruiting officer. 3210-3212. As far as experience goes are under chief engineer; master-at-arms only enters name to know who is out of the ship, submitting liberty list to commanding officer, the sole authority for giving leave. 3213. Some reason in their complaint about uniform; short jacket does not look well on some men; whatever uniform is given to should be given to other chief petty officers. 3214. In establishing regulations for would enter by name of trade with similar rating to other masters of a trade, namely, first-class petty officers depending on pay for obtaining. 3215. None discharged from steam reserve for misconduct or inefficiency, but knows of one dismissal for insubordination, one for dirty habits, and one for leave breaking; none have purchased discharge. 3216-3217. Not getting pension beyond that of chief petty officers a cause of complaint; probably increase of if made warrant officers would satisfy; do not consider much on first entry; many advantages in navy forestalled by clubs; leave, time counting, and pension now the only ones. 3224-3225. Have to pay so much a week to trades union for advantages they receive; allowance when sick or out of employment varies according to society. 3226-3228. If entered as petty officers would be put into petty officers' mess, thinks would not object to, would have boy to clean out; believes if master-at-arms were one of the mess it could be arranged without aquabbling. 3229-3232. System of entering a highly cultivated man from factory at a higher rate of pay instead of his going through lower grades would not be better; thinks artificers are much improved as workmen. 3233. Wages sufficient for first ten years; should like to see small increase on re-entering, and with other classes rates should be progressive after. 3234. Present impression is will re-enter at end of ten years on present pay, knows one who has; suggests on entry should be allowed to get clothes from paymaster. 3235-3236. Monkey jacket should be sufficiently long to cover hips, fitting body, this should apply to seamen as well as engine-room artificers. 3237.

In General.—Is captain of steam reserve and of the "Asia"; last commands "Black Prince" and "Inconstant." 3127-3128.

ALBERT J. DURSTON, Esq., R.N., ASSISTANT TO CHIEF ENGINEER, H.M. DOCKYARD, PORTSMOUTH.

Engineer Students.—Has had three years' experience in training students; if entered from a higher social class recommends entry between 14 and 16, their not picking up and depositing tickets on going in and leaving yard, and that an officer be appointed specially to

look after training in addition to the leading man. 3238-3241. Would do away with evening work; instead of broken days at school proposes two whole consecutive days each week; all should keep a diary from first entry. 3242, 3254-3256, 3268-3272. History, and translation of English into French, should be subjects for examination on entry, and some simple questions in mensuration might be inserted in arithmetic paper; after entry in dockyard examination in general educational subjects, excepting mathematics, mechanics, physics, and practical sciences, should be done away with. 3243-3245. Division in fourth year amongst different shops as mentioned in circular of 1873 might be of more advantage if they had three months in pattern shop, two months in foundries, copper-smith's shop, and smithery, and three months in boiler shop, including pattern shop, to which at present they do not go. 3246-3248. During fifth year proposes should be employed six months on hulls of iron ships and six months afloat assisting in repairs of ships, discretion being given to send into erecting shop. 3249-3251. Should be employed on jobs most beneficial to themselves or their good training, are now subservient to efficiency of department; time of should not be charged to any work at all on conversions; would wish to see work kept in separate account from dockyard work. 3251-3254. Advantageous to allow to reside and mess in dockyard if expense be not too great. 3257-3258. Thinks do not suffer from jealousy on part of workmen: only in fitting shop, where trade boys who are the sons of the workmen are brought up, men, it is thought, lean towards their own sons. 3259-3261. Practical education might be improved if an officer were appointed specially to look after. 3262-3263. Imagines that student who stated he had only had three jobs of work in erecting shop in three months, meant he had three for the benefit of the service and rest of the time he was employed in his own instruction. 3264. Those who recently went to Greenwich of good physique; some young lads in factory rather small; it would be better if they entered at later age. 3265. During last year of training have opportunities of seeing large engines driven, and to a certain extent take part in driving; attend trial trips, and on factory trials manipulate engines or assist. 3266-3267. Could occasionally give lecture to on theory of steam-engine during an evening. 3273-3274. Asks elder ones occasionally questions as to work and theory; if officer were appointed specially to look after in addition to leading man, it would be all that is required as regards their getting instruction in steam-engine. 3275-3276. If better class were entered would not make any difference in their being looked after. 3277-3278. By keeping diary would learn to sketch; if necessary, should pay for instruction in drawing outside; in drawing office three months of their time, under old system were generally employed there for last six months, bringing drawing before they went there to show what they could do. 3279-3281. An intelligent student of four or five years' standing would be as good, as far as workmanship is concerned, as less intelligent students of six years, but he would not have had opportunity of picking up his practical engineering and the general arrangement of engines. 3282-3283. Would act as stimulus to work if students could pass examinations at five years and gain a year's time; practical examination would have to be watched, and arrangements made to give longer time afloat. 3284-3286. Only one class of certificate given on final examination; would be advisable to report on skill as workmen, and it should have effect on standing in navy, would act as a stimulus to practical work; certificate might be divided into three parts, workmanship, engineering, knowledge of mathematics, and practical sciences. 3287-3292. Boys over four years' standing attend lecture on Wednesday evenings on chemistry, but it may include electricity and magnetism; have no lectures on steam-engine. 3293-3294. Might be a stimulus to students if portion of appointments were offered to articulated pupils in outside trade; articulated pupils should pass same examinations and would be of same social position as future students. 3294-3297.

WILLIAM R. TRIM, FITTER, H.M. DOCKYARD, PORTSMOUTH.

Receives 36s. a-week; was in navy as engine-room artificer about six months, served in "Resistance" and "Caledonia"; before then served as a fitter in the dockyard for about three years. 3298-3311. Served time at engineer's and optician's; after completing was employed at Ordnance Gun Wharf as a fitter, wages 28s. a-week; then entered factory and received 30s. a-week. 3312-3327. Entered as an engine-room artificer, thinking it was worth leaving dockyard to take, found mistake out afterwards;

thought 35s. a-week at sea better than 34s. on shore, that pension and other privileges would make job better. 3328-3333. Found out after entry in "Resistance" that regulations about messing were different from those he had seen at steam reserve office; instead of messing with master-at-arms, schoolmaster, writer and other chief petty officers, had to mess with blue jackets or anybody; another supernumerary engine-room artificer in ship messed with blue jacket petty officers. 3334-3347. The great objection was not being allowed to mess with writer and schoolmaster, another was the size of chest given him, had not been fourteen days in service before he was ordered to get another; ship's corporals' mess into which he was put was not large enough; seldom sure of getting a meal as boy who attended to had to do deck work as well. 3348-3349. Expected someone would attend on as it was in the rules; impossible when on watch could keep mess clean. 3350. Hours of work nothing out of the way, only comfortable time; other engine-room artificer as uncomfortable as he was. 3351-3352. Seamen not uncomfortable, had proper place to go to; stokers had nice mess and wash berth, whereas he had to wait until they had washed and go and get his own water. 3353-3355. Being thoroughly disgusted purchased discharge for £12. 3356-3358. Is married and belongs to a trades union. 3359-3361. Would not advise a friend to go into service at present; if were going in again would wish to be put out of power of master-at-arms, and under chief engineer, the former is a great torment, and always interfering with engine-room artificers, finding fault and stopping men from going ashore. 3362-3365. Rules of service you are expected to comply with, but it is too much for men who served their time at a trade to have ship's corporal or master-at-arms a torment to, it might do for a young man brought up in navy; knew should have to obey orders from chief engineer, but did not think should have to obey those of master-at-arms and ship's corporal and the likes of them. 3367-3370. Was given to understand pension would be £75 a-year; no provision is made for a man's widow, does not know whether widow would get anything from trades union, or if he lost his life in dockyard; shipwright going into navy on becoming a warrant officer gets good pension for himself, widow and children, while fitters who reckon themselves the leading trade, do not. 3371-3374. Permanent employment is sought after, but a steady man can get work anywhere; men who go into navy and stop on present scale are frightened if they left they would not be able to get work anywhere else. 3375. Engine-room-artificers in service are good men, but would be better if they had better position. 3376. Pay to induce to go to sea should be 6s. to 7s. a-day to start with, having a first and second class according to ability; an advantage for blacksmiths, boilermakers and coppersmiths to join service, but a fitter would get more money in private firm than in navy. 3377-3378. Good boilermaker getting average pay of navy would not enter, perhaps those so anxious to come are young fellows just out of their time. 3379-3380. Engine-room artificers should rise to 8s. 6d. or 9s. a-day; would do without rank for comfort and pay. 3381-3382. Plain blue working dress of merchant engineer would do for uniform, with a decent inexpensive one to go on shore; present uniform rather expensive, outfit cost £20, and had £2 9s. 4d. allowed for it. 3383-3386. Complained about mess to chief engineer; there was a little more comfort in "Caledonia," messed right forward with the two writers and schoolmaster, and had boy to attend on; master-at-arms and ship's steward messed by themselves. 3388-3391. Would rather mess alone; writer and schoolmaster nice men to mess with, master-at-arms only that was objectionable. 3392-3394. Would rather be under chief engineer and have no rank; would get leave from chief or senior engineer, and if captain had no objection master-at-arms could not stop until liberty men went; master-at-arms from what he saw was very near captain. 3395-3397. Boilermakers and smiths not glad to come into service at present pay, but there is not much difficulty in getting; artificer smiths not superior to ordinary blacksmiths in ship; boilermaker, senior to him, when he had work in engine-room came to be shown how to do it. 3398-3404. Fancies could take charge of engine-room, but has never had opportunity of doing so; does not see why engine-room fitters should not be able to take charge in engine-room of small ships after six months at sea. 3405-3407. Boilermaker, who asked about his duty in engine-room, did not know piston rods or how to pack them; fitter could put patch on boiler, stop leak in a tube or replace one, but believes a boilermaker never makes a fitter. 3408-3411. Only time reported by master-at-arms was on account of size of sea chest; had no locker, clean and dirty clothes and uniform had to go together. 3412-3413. Does not know what is the usual accommodation

given to engine-room artificers; has spoken to a good many, all find fault with master-at-arms having anything to do with them. 3414-3416.

MR. WILLIAM TODNER, ENGINEER, R.N.

Engineer Students.—Would stimulate if some trained in private firms competed with. 3539-3540. Thinks Admiralty should nominate, parents should make applications direct; schoolmasters outside dockyard cram for the examination. 3541-3543. Not satisfied with class entered, pay they receive enables fathers to put in; nomination would ensure proper class being entered. 3544-3545. Practical work not so good as it might be; education could be kept up to proper standard, and practical work improved; some are good officers, and handy at anything. 3546-3549. Did not learn mechanical drawing himself before entry as an engineer, but can sketch anything required, knowledge of at present time of great value. 3550-3551. Evening school should not be discontinued. 3600. Should reside in dockyard, and have a mess and sleeping place. 3611-3615.

Engineer Officers.—Has not qualified for chief engineer, not worth while, is over 42 years of age; did not think of at earlier period, no probability of promotion; could not make up time. 3422-3424, 3590-3594. Able to retire in 2½ years on full pension of £130 a-year; pay now 10s. a-day and 1s. charge money; over 20 years in service. 3425-3430. Served time at engine makers at Newcastle. 3431-3432. Would have accepted maximum pension, if regulations had permitted, five years ago. 3433-3434. To improve flow of promotion would reduce number and substitute artificers; reducing list by letting engineers over 40 go on increased pension of 6d. a-day for each year served, and allowing those at about 36 to go. 3435-3441. Passed an educational examination on entry. 3442. Thinks pay should be progressive; expected when he entered to be a chief engineer about 32, for good of service promotion to that rank ought not to be later. 3531-3533. If promoted would have to go on half-pay of 6s. a-day for twelve months, should consider it a hardship; promotion to men in his position gives less money, and throws back in time. 3524-3538. Engineer of 42 years of age should not have less than 12s. a-day; would only have been promoted to chief three months ago if he had qualified. 3552-3554. If pension was not sufficient would look out for situation to superintend an engine, it depends on qualifications and character whether this sort of work is given to men leaving service. 3555-3558. About a third of the engineers between 30 and 40 if pensioned would get employment somewhere. 3559-3561. Assistant engineers should enter as engineers, and begin at 6s. a-day as now, with progressive increase; would not mind rank not increasing if pay did. 3572-3574. Should be capable of fitting and attending to different parts of the engines; then they would be able to direct others; those who have joined lately not such good workmen as engine-room artificers as a rule, they should be. 3583-3584. If rank of assistant were done away with does not think there would be dissatisfaction at young officers having same rank as men who had served for twenty years; uniform and pay should be in accordance with time of service. 3595. Wish of engineers that engineers' mess should be abolished; unless pay is increased they could not afford expense of relative messes; alteration could be made now; lived in gun-room when young in service; in future a few could be put in ward-room; has seen a number of engineers he would not put in gun or ward-room, would let them go by themselves or leave service. 3596-3599, 3601.

Engine-Room Artificers.—Had one in "Waterwitch" for a short time; a fitter, a good workman, came from Devonport factory. 3443-3448. In "Monarch" during commission there were six; she has now four; if engineers were reduced her complement should be six, with one chief engineer and five engineers. 3449-3451. In ship like "Monarch" would like fitters, and for general service 70 per cent. of fitters; fitter can do boilermaker's work when required; boilermakers can do blacksmith's, but not fitter's work. 3452-3454. Had smith as engine-room artificer in "Monarch," and there was a blacksmith in ship, former the best smith. 3455-3458. Not desirable to put smith on same footing as fitter, the latter a more useful man. 3459-3460. Coppersmith in "Monarch" not good at attending to boilers or engines, knew his trade; require a man capable of doing other work than his trade. 3461-3466. Kept watch in stokehold, one in each watch; under steam an engineer

was in stokehold; assisted in engine-room when called on; never obtained certificate for having taken charge of engine-room; boilermaker, blacksmith, and fitter were qualified to take charge of engines. 3467-3472. Those receiving qualifying certificates to confirm would be fit to take charge of engines in a small ship; considers are superior as workmen to junior engineers. 3479-3482. If were increased and staff was good would not be necessary to employ engineers on ordinary occasions in manual work; whatever the number all ships should have a proportion of engineer officers of superior education and position. 3483-3485. Pay not sufficient to induce good men to join; suggests 6s. 6d. on entry, rising 6d. a-day every five years, to go to 7s. a-day; re-entering after ten years at 6s. 6d. a-day; position is good enough. 3487-3492. Uniform satisfactory excepting jacket; complain it is cold; would let them have warm tunic, a reefer; look slovenly in monkey jacket. 3493-3498. Ought to have separate mess, chief engineer to be responsible for cleanliness of, and for clothes and hammocks. 3499-3500. Would not have under master-at-arms; should obtain leave from senior or chief engineer; used to give leave to in "Monarch," sending notice to master-at-arms. 3501-3503. Clash with master-at-arms about their own little grievances, they told him they had a right to mess with him; messed in "Monarch" in mess told off for, it was not comfortable, open, simply a mess table. 3504-3508. Should mess in ship like "Monarch," if under chief engineer, in enclosed place in main deck battery; if on lower deck, senior and chief engineer to be responsible for cleanliness of mess; might mess in turret-room. 3509-3511. No difficulty in increasing numbers if advertised for, and pay were increased. 3512-3513. A few good men might be made warrant officers during last five years of their time, would be a great inducement to good men. 3514-3515. Would have 70 per cent. fitters; 30 per cent. boilermakers; not necessary to have copper-smiths. 3516-3521. Suggests pension be increased a little; if made warrant officers would like to serve on in same way, thinks would not be above doing manual work. 3522-3524. Capable of work up to 50; might remain after twenty years' service upon an increased pension; would like to come on shore for a few years after a period at sea on same pay, time going on, thinks would be satisfactory to factory. 3525-3530. Would rather have from private trade than factory; boys learn their trade better in private firms than in Government factories; not aware that trade boys in factories are taken into private trade on completion of their time instead of entering service. 3563-3570. Have no stated place to wash in, could wash in stokers' bath in "Monarch"; desirable to make arrangement to give bath room to themselves for a time. 3602-3604.

In General.—Serving in "Waterwitch," has been in her 2½ years; senior engineer in "Monarch" before for five years. 3417-3421. Occasionally kept watch in "Monarch"; did general superintendence under chief engineer. 3473-3474. Had a little intercourse with engineers in mercantile marine before entering service, but not since. 3562. Customary for all people connected with engine-room to be under chief engineer, but in "Monarch" each engineer was responsible to lieutenant of the division. 3575-3577. Three engineers, with a staff of men each, had charge of double-bottom in "Monarch," they kept watch besides; junior engineer did office work. 3578-3582. Pay in merchant service is more on an average; is independent of mess, Cunard Company keep their engineers in everything; does not know they have any pension. 3587-3589. Small engines in compartments in "Monarch" were in charge of engineers in charge of the respective compartments. 3605-3610.

GEORGE NANCARROW, ENGINE-ROOM ARTIFICER.

Serving in "Vesuvius" 4½ years in service; has served in "Asia," and at sea in "Spartan" nearly four years. 3616-3621. Went to sea from "Volcano" floating factory five months after entry; served before in steam factory, Portsmouth. 3622-3624. Was 32 years of age, and had been eight years in steam factory before entering "Volcano"; served time in private firm of engineers at Portsmouth. 3625-3631. Remained after serving time, and received 5s. a-day; in factory, had 5s. 8d. a-day, 34s. a-week. 3632-3636. Trade, an engine-fitter, worked in factory in millwright's shop; entered as fitter and hired man. 3637-3642. Went to sea as he thought he should like it, and as discharges were taking place at dockyard. 3643-3644. Messed in "Spartan" with first-class petty officers, and ship's steward and ship's cook, chief petty

officers; was very uncomfortable. 3646-3651. In "Spartan" there was another engine-room artificer, a first-class corporal doing duty of master-at-arms, also two engineers and a chief. 3652-3654. Kept watch in engine-room during commission; other artificer kept stokehold watch; obtained certificate of qualification to take charge after he joined "Spartan"; had to do with engines during the time in his trade, and so obtained knowledge of management. 3655-3661. Other artificer a boilermaker; could not take charge of engines, but did so during last part of commission to qualify for confirmation, he did not do fitter's work, there was always his own to do; think could himself do any job wanted on board ship. 3662-3671. Does not belong to a trades union, other artificer did; does not know whether there is any difficulty about transferring work according to laws of the union. 3672-3675. Very uncomfortable in mess; other petty officers thought he ought to take turns as cook and at scrubbing deck; objected, went on quarter-deck several times, captain said no one was provided for mess, and the best must be made of it. 3676-3677. Captain afterwards gave separate mess, with two boys to look after, but, as they had duties on deck, was just as bad off; chief engineer objected to his cooking, as he was wanted below; had food in mess in addition to ship's provisions, lived pretty well. 3678-3685. Progressive pay and a comfortable mess would be an encouragement to engine-room artificers; could have separate mess, more comfortable if someone was excused to look after. 3686-3689. Chest is not large enough, had no locker; would prefer larger chest without locker. 3691-3695. Uniform, short jackets, not very suitable, are cold in winter; cannot wear monkey-jacket overall at divisions, nor when going on shore. 3696-3699. Pay should be, after ten years, 7s. or 8s. a-day, after twelve or fifteen years, 9s.; pension the same as other chief petty officers, £52 a-year, thinks it is an attraction to join. 3700-3703, 3749-3751. Is married. 3704. Trades in reserve five, moulders, fitters, blacksmiths, copper-smiths, and boilermakers; considers are equal in value. 3705-3708. Stoker mechanic was blacksmith in "Spartan," ship's blacksmith was a superior mechanic to, the latter would have been worth entering as an artificer, supposes he did not enter, thinking he could not pass educational examination; on entering service himself had to pass an examination. 3709-3717. Kept rough engine-room register in "Spartan," it was written out fair by chief engineer. 3718-3719. Ship's corporals interfered with; wanted to be run after and told when they were going on shore, they had many ways of annoying a man. 3720-3722. Asked for leave, first of chief engineer, then commanding officer, and then had to tell master-at-arms; reported to corporal on coming on board; had leave whenever could be spared from engine-room, no difficulty in obtaining. 3723-3733. Likes service, but would like it better if there was more comfort on board; went to sea at 32; likes sleeping in hammock, paid stoker 7s. a-month for scrubbing it and washing clothes. 3734-3740. Washed in stokers' bath, sometimes had to wait until they had done; had to fetch water if did not ask some one to do so. 3741-3743. Stoker cannot be spared in small ships to clean mess; knows of artificers in ships like "Spartan" who wanted to mess with stokers to be exempt from duties in mess, it was not satisfactory. 3744-3745. Mustered with stokers; there was a sub-lieutenant of the division. 3746-3748. Would think of re-entering after ten years after alterations are made; should prefer no rank, and be wholly under chief engineer. 3752-3754. Chief petty officers might complain at artificers having treble their pay and increased pension in proportion, perhaps it would lead to great dissatisfaction; artificers would prefer pay and pension to relative rank. 3755-3758. No dissatisfaction among chief petty officers in "Spartan" at artificers having more pay, it was about mess; artificers would prefer mess near engine-room, as their work is very dirty. 3759-3760. Ship's corporal did not make himself unnecessarily disagreeable in carrying out discipline, has heard complaints from others; entering late in life may make rather more impatient of discipline. 3761-3764. Fitter artificer most suitable to take charge of engines of a small ship. 3765-3766. Does not know how long shall remain in "Vesuvius"; lives, and takes turn of sleeping on board; draws provisions from "Excellent"; has been paid for, better than being on ship's provisions; ship's provisions ought to be considered as an element in pay. 3767-3777. Would be popular if were admitted into factory after service at sea with same pay and prospect of pension; thinks many would come on shore to factory, after re-entry, for five years, on understanding they must go to sea when required. 3778-3780. Some would prefer to go on receiving pension, some to serve on and get an increase; gets pension at 52 years of age. 3781-3783. Would not like to be made warrant officer after twelve

years' service, and have to serve to 60. 3784-3785. Life not insured; artificers would consider it a reward if men of good character were given service in reserve after having been at sea five or six years. 3786-3790.

CHARLES J. MARTIN, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Not intimately acquainted with regulations for entry of; competition open to anybody and selection is made by; system not good, should be nominated by Admiralty to select from better class. 3896-3905. Has been away and has not seen system of training at work. 3906-3907.

Engineer Officers.—Promotion is very slow; was promoted to chief engineer at 38, slightly below present average age; promotion due to Mr. Childers' scheme. 3803-3809. Joined as third class assistant; will have to serve seven years longer before retiring to get sea time in; should lose a large proportion of junior time by retiring at 50. 3810-3812. Suggests chief engineers be increased to 200 or 210 to give promotion, there would be employment for them in smaller vessels; would not increase if it involved their going on half-pay. 3813-3818. If there were forty more chief engineers promotion would be much more satisfactory; to improve promotion engineers might be reduced as a body and in certain ships; in "Sultan" would reduce from nine to five, increasing artificers from four to six or seven. 3820-3824. Old engineers should be retired, and, in consideration of their disappointment in not being promoted, should be offered a fair pension; engineers over 40 should not be promoted. 3908. Fair pension would be 6*d.* a-day for every year's service; as chance of promotion is so little, pay of an engineer passed for chief ought to progress to 13*s.* a-day; an engineer should be promoted to chief engineer at 35. 3909-3911. Position of inspector of machinery is beyond reach, so many men senior to him; never considered question further than the position which, especially in the reserves, is a very responsible one and somewhat underpaid. 3912-3914. Thinks 6*d.* a-day for every year served would induce engineers over 35 to retire; if offered to whole body a large proportion of the best of the young men would go, desirable therefore to limit optional retirement to upper half of the engineers. 3915-3919, 3940-3944. Messed in ward-room in "Teazer" before promotion to chief engineer; would prefer messing in ward or gun-room to engineers' mess, thinks all engineers would, provided pay was increased progressively to 13*s.* a-day. 3932-3938. For general efficiency of service an engineer might mess in gun-room for eight years, afterwards be eligible for ward-room. 3940. When he entered expected to be made a chief engineer in ten years, served 16 before promotion. 3945-3947. Would be considered a boon if pension were called retirement; some engineers would probably value a step in rank if retired. 3948-3950.

Engine-Room Artificers.—In ship like "Sultan" if four engineers were taken away, would put in six or seven artificers; are valuable as working men, and addition might be made with advantage to service. 3824-3825, 3829. An artificer may be a greater expert with tools than a young engineer, but in engine-room you would require a man of more resource, general knowledge, and greater reasoning power; in a ship, whatever the number of artificers, would always wish to see a body of highly educated engineer officers. 3826-3828, 3830. Would introduce fitters principally; in ship like "Sultan" would have four fitters and two boilermakers; fitter more capable of doing boilermaker's work than boilermaker a fitter's. 3831-3833. Was shipmate with engine-room artificer in "Cadmus," a fitter; was a fair man, kept watch in stokehold when working at high speeds, in engine-room at low speeds and in case of an engineer being sick. 3834-3839. Not necessary to have ordinary blacksmith, boilermaker would do the work; a percentage thoroughly acquainted with engine smithing would be valuable; may meet with fitters who have a fair knowledge of smithing. 3843-3845. Artificer in "Cadmus" messed with master-at-arms, ship's steward, sergeant of marines, and perhaps ship's corporal; he complained of sleeping accommodation, small mess and room; slept in hammock on lower deck; no other arrangement could well have been made about messing. 3856-3865. Complained of master-at-arms interfering with leave. 3866-3868. Washed in stokehold; stokers had bath bay at end, but there was neither washhand basin or bath. 3869-3871. Thinks regulations will hardly enable good men being obtained, suggests increase of pay, 5*s.* 6*d.* on entry, and then progressive; ought to be entered for 20 years; inducements of progressive pay and pension should

be held out for men to remain over 10 years. 3874-3879. Would not make warrant officers after 10 years. 3880. Minimum pension after 20 years should be £55; not aware pension was £52 a-year. 3881-3883. Does not matter whether men came from Government factories or private trade so long as they are qualified. 3884-3886. Some improvement should be made in uniform, should have a working one and a coat; canvas suit allowed could be made working one, but thinks ought to have a more suitable dress. 3920-3922. Most important to impress upon that they are working men, and dress should be a *bond fide* working one; are allowed suit of fearnought for going into boilers and working in bilges. 3923-3925. Usually wear a lot of old clothes without regard to appearance; recommends a suit of serge, with short close fitting jacket for engine-room duties. 3926-3929.

In General.—Is a chief engineer of May, 1870; serving in "Zealous"; served previously in "Cadmus"; in service 21½ years. 3791-3798. Three months on half-pay after promotion; took chance of employment after invaliding from East Indies; had usual full-pay leave after paying off of "Cadmus." 3799-3804. Had a stoker mechanic in "Cadmus," a boilermaker; had learned trade in Devonport dockyard; as a blacksmith could not be called well qualified, was a handy man for a rough job. 3844-3849. Ship's blacksmith was properly qualified, did not understand anything about interior of boilers, but was ready to assist in repairs requiring smith's work. 3850-3855. Served time himself at Great Eastern Railway; latter part on repairs to marine engines. 3887-3888. Entered service at nearly 22 years of age, had not had management of engines before; "Penelope" paddle frigate was first ship, kept stokehold watch in her for about first six months, and then the watch of a senior engineer on his falling sick. 3889-3895.

WILLIAM HOLLOWAY, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Nomination should be introduced in order to get more respectable class; confined chiefly to people living in dockyard towns, sons of dockyard men and boys from Greenwich School, no social class excluded; system prevents higher social class from coming in. 4029-4032. Aware of difficulty in admitting to gun-room mess after entry as engineer officers, but it is not so great as generally supposed; if boys could be obtained away from dockyard towns, likely to get better class. 4029-4034. Great advantage in training received at Greenwich College; residing and messing in large building inside dockyard opens up large question, would have to be under strong restriction. 4038-4039.

Engineer Officers.—When he entered engineers, served eight to nine years before promotion to chief; served 18 years himself; as engineer in "Minotaur" received at first 9*s.*, afterwards 10*s.* a-day, had no allowances. 3959-3963. Thinks it desirable to reduce number of engineers, and increase number of artificers; suggests for "Minotaur" five engineers and four or five artificers; by decreasing could do with less room, and eventually dispense with engineers' mess; promotion would be expedited if engineers were reduced one half. 4012-4016. When in charge of "Swallow" messed in ward-room, other engineers had their own mess; messed in ward-room five years before he became chief engineer; lost charge money and cabin by going to "Minotaur." 4017-4021. Promotion by selection open to jealousy, does not like to give an opinion upon the question. 4022-4023. Agrees with "case of naval engineers," except scale of pay on entry; represents grievances fully and fairly; would retire on 8*s.* a-day at 50; barely able to get in 11 years as chief engineer at 55 years of age; has nearly 22 years' service with junior time. 4024-4027. Sixpence a-day for every year served is the scale suggested for engineers; men when promoted to chief should have some advantage; was 42 when promoted, age for promotion now runs up to 45. 4028. Would be satisfied if pay were assimilated to that of other branches of service, more especially Medical Department; scheme was drawn up with reference to ages at present time. 4041-4043. Would be satisfied if put on same footing with other classes of officers, relative ages being considered; Medical Officers put to greater expense for education as compared with students, but not with large proportion of engineer officers who served their time and paid large premiums. 4044-4046. Desirable to reduce list of engineers to get good flow of promotion, must offer them retirement to go; understands difficulty which would arise through preventing men accepting moderate pension by offering higher scale of pay; no doubt if men under 40 had option

of retiring on £130 or £140 a-year, and those who served until 45 were offered 10s. a-day, it would clear list; many who had not passed for chief would go. 4047-4049. According to scale, men earning 15s. a-day would retire on 8s. 6d., no doubt would go. 4050-4051. Those at Greenwich, and younger engineers who have better chances, would not go; engineer officers now qualify for chief on entry; thinks very few engineers not qualified would come forward, being from 40 to 45 years of age, and they would not care to go into mathematical questions at time of life. 4052-4054. Position of inspector of machinery far beyond reach, has not looked into scale of pay. 4055. Thinks 7s. instead of 9s. a-day at time of entry would be fair. 4056. When "Minotaur" was first commissioned there were two chief engineers in her, it did not work well; would not recommend two chiefs in any ship; under present regulations junior chief is an elderly man, while senior engineer has not lost all energy, and works in hope of promotion. 4057-4060. Should have more and better fitters in large ships; engineers will not become improved class until they have no occasion to take hammer and chisel, of course should be able to supervise. 4061. Advantage to increase number of chief engineers for sake of promotion, should be one in each ship commanded by commander. 4061-4063. Would not answer to have two chiefs in one ship even if promoted much younger, say 35; has not struck him that it would be desirable to have two classes of chiefs, one for small, another for large ships. 4064-4066. Would like to see term "assistant engineer" done away with after probation of one or two years; advantage of term of years for increase of pay, tantamount to having step of promotion. 4067-4069. Step after twelve months' probation would give a great deal of gratification to juniors. 4070.

Engine-Room Artificers.—When in "Minotaur" there were three or four artificers. 3964-3966. There is a blacksmith in "Enchantress" borne to look after steam cutter; is a very good man as a blacksmith, he served time in dockyard, joined as artificer, and was three or four years in "Lord Warden" as smith. 3967-3970. Very excellent smith by trade; works and takes to pieces engines of steam pinnace, and does packing under engineer, thinks learnt it in "Lord Warden"; he was recommended by Mr. Oliver to take charge of Admiralty Pinnace. 3971-3974. Had boilermaker and two smiths in "Minotaur" but no fitter; smiths were very good, but had stoker equally good; boilermaker most useful. 3975-3978. Every ship should have one or two boilermakers, and the others fitters. 3978. If had four artificers on board, three should be fitters, and one boilermaker; smith not necessary. 3979-3980. Blacksmith's work in "Minotaur" generally performed by stokers; ship's blacksmith was very good. 3981-3982. Artificers in "Minotaur" messed on main deck with gunner's, carpenter's, and boatswain's mates; should mess by themselves. 3983-3986. Continual complaints about position, especially with respect to messing; their having to clean mess partly done away with after representation, but no change was made in messing. 3987-3988. Would give them engineers' mess place, if engineers were put in ward and gun-rooms; should mess by themselves if impossible to do away with engineers' mess. 3989-3991. Could be put in tank-room above condenser, when condensing heat is not above 70°. 3993. No complaints about chest in "Minotaur," does not remember size; thinks were altered, order came out to make them smaller; has heard complaints about short jacket, want tunic like that of master-at-arms, or men of equal rank with themselves. 3994-3996. Would not like to have similar dress to chief petty officers; have idea that they are better than sailor chief petty officers. 3997. Complaint made about interference of master-at-arms in matters of messing and leave. 3997-3998. Always asked leave from engineer department, but difficulties made about mess not being cleaned. 399-400. Does not think jacket looks well; will never get first-class fitters for present pay, as they can get 6s. or 7s. a-day outside; get 8d. and 10d. an hour piece work in Woolwich Arsenal, thinks standard there for first-class men is £2 a-week. 4001-4003. At sea get 5s. a-day on entry, and 5s. 9d. after three years, including Sunday, but dockyard men are on shore on Sunday with home comforts; when in steam reserve not on actual duty on Sunday. 4004-4006. Pay should rise periodically; 7s. 6d. a-day after 10 years, and 8s. after 15 years, with prospect of pension would be satisfactory; dress and mess vexed questions, but thinks present class would be satisfied with little more pay, a question whether men of superior class would come. 4007. Has no doubt artificers earn pay, but never could trust one to do a job without supervision; fitters are the best workmen, on shore they will not associate with black-

smiths and boilermakers. 4008-4010. If could have only one artificer would choose boilermaker, as he might be trained to do things in engine-room; four years since he was in a ship with an artificer. 4011.

In General.—Has been chief engineer four years; is serving in "Enchantress," is first ship he served in as chief, has been three years in her. 3951-3955. Served in "Minotaur" before as senior engineer, was four years in her. 3956-3958. Eighteen years in service before promoted to chief. 3959. Would not from choice put son into service in own profession. 4035-4037.

CHARLES WEBSTER, MASTER-AT-ARMS.

Is master-at-arms of "Monarch"; has been so nine months; previously 1st class ship's corporal in "Resistance." 4071-4074. Four engine-room artificers in "Monarch"; only difficulty with them relates to mess; all chief petty officers mess together excepting himself, ship's steward, schoolmaster, chief boatswain's mate, chief gunner's mate, and four engine-room artificers. 4078-4080. The latter disagree; difficulty caused by their higher pay, and wish to live much better than others, also on days when white clothing is worn, artificers come into mess in dirty things. 4082. Complaints come chiefly from executive petty officers. 4083. Occasional difficulty as to cleaning mess; in "Resistance" an ordinary seaman excused to attend; in "Monarch" two boys attend until nine o'clock a.m.; artificers have nothing to do with cleaning. 4084-4085. Leave book kept by master-at-arms; men obtain leave from commander, and inform master-at-arms, it must also be sanctioned by departmental officers; go on shore without waiting for ship's company. 4086-4087. No complaint as to want of room for mess. 4088. In "Resistance," artificers, schoolmaster, chief boatswain's mate, and chief gunner's mate messed under screen rigged before bulkhead on maindeck. 4089-4090. In "Monarch" artificers messed in turret-room on lower deck; no complaint as to size of chest, they and chief petty officers have lockers, which generally contain working clothes. 4092-4095. Artificers wash in ship's company's bath-room; may use it when they like; ship's company use it in evening; artificers in afternoon, at end of each watch. 4096-4099. Has never had to take artificers on to quarter deck; in "Resistance" one was unfit for duty. 4100-4101. In "Monarch" (last commission) separate mess for civil and executive chief petty officers found to work more successfully than at present. 4102. Present commission artificers and ship's company mess together on lower deck; there is a separate deck for stokers and artificers, thinks it a good arrangement, as they would sooner mess there among their own people. 4103-4104. Is responsible, under first lieutenant, for the cleaning of the mess; would speak to chief gunner's mate, not artificers, if found dirty. 4106-4110. Thinks artificers should mess separately; would prefer to do so himself as he might have unpleasant duties which he could not well do if a messmate. 4113-4115. Wears short jacket as undress uniform; full dress uniform a single breasted frock coat; difference in his from schoolmaster's, three buttons on cuff. 4116-4121. Artificers at inspection wear short jackets, no complaint about; may go on shore in pea jacket. 4122-4124. Does not think difference of pay causes jealousy; unpleasantness caused by artificers, who consider themselves tradesmen, and therefore superior to those who have lived all their life at sea. 4125. The artificers to blame about squabbling, not so amenable to discipline; would be better as 1st class artificers without relative rank, and almost exclusively under chief engineer. 4126-4128. Thinks artificers would prefer better pay and forego pleasures of rank. 4129.

ROBERT URQUHART, ENGINE-ROOM ARTIFICER.

Engine-Room Artificers.—Serving in "Crocodile"; has been two years in her; previously four years in "Malabar." 4130-4132. Entered service as artificer in 1868; served time at Glasgow. 4133-4135. By trade an engine-fitter; two other artificers in "Crocodile"; one by trade a blacksmith, the other a boilermaker. In "Malabar," one boilermaker and two fitters. 4138-4140. After serving time earned from 30s. to 35s. weekly; entered service at Woolwich; applied to Admiralty while in Ireland to enter as engineer, received answer that no engineers were taken from private firms, and circular conveying first intimation he had of engine-room artificers being entered. 4145-4149. Mess in "Crocodile" on mess-deck by themselves with ship's company; attended upon

by stoker who cleans mess. 4150-4154. Sleeps in hammock, pays stoker 4s. a-month to attend to; stoker does not wash clothes unless paid. 4155-4159. Wanted to go in West India Mail Service, but had not patience to wait, so joined service. 4160. Kept watch at sea in stokehold; has kept in engine-room when under way, with assistant engineer on platform; about four men on watch; same man does for each engine. 4161-4166. Has sole charge of steam launch in "Crocodile," works it under way. 4167-4169. Not much inducement to re-enter after ten years; will not decide till end of time. 4170-4171. Would like separate mess berth; in "Crocodile," an enclosed place. 4172-4173. Has been on board "Sultan"; has seen artificers' mess berth there, but forgets what it was like. 4174-4175. Has assisted in caulking and plugging tubes of boilers; could put on screw patch; daresay could put in tube. 4176-4178. Does not belong to trades' union, nor had to do with; men at Glasgow do belong to. 4179-4181. Not married. 4182. Artificers would like to be under chief engineer, and get leave from him; well off in "Crocodile," get leave from chief engineer; had difficulty in "Malabar" when first there, when could be spared, leave not granted, and when leave was given on deck, could not be spared. 4183-4186. Same master-at-arms in "Crocodile," since he has been there; on first joining wanted to interfere, made difficulty about uniform. 4187-4189. Would like better coat, jacket not being warm enough; pea-jacket not generally allowed, would allow it in "Crocodile." 4190-4192. Has no regular wash place; get two basins from engineers' store-room; do not wash in stokers' place, wash in place just off store-room. 4193-4195. Has to wait for bath till stokers' place is clear or men gone away; cannot leave watch to get bath before them at sea. 4196-4198. £60 a-year pension after 21 years would be an inducement to re-enter. 4199-4200. Has open mess in "Crocodile." 4201. Would like to look forward to increase of pay; thinks on first entry it should be 5s. 9d. or 6s. a-day. 4202-4203. Would think 8s. 6d. a-day to progress to 9s. fair pay for second term of ten years. 4204. Would rather give up relative rank as chief petty officer, and have better pay and be under exclusive control of chief engineer; does not understand much about privileges of rank. 4205-4236.

EDWARD PAGE, CHIEF GUNNER'S MATE.

Serving in "Monarch." 4207-4208. Has been over 12 months in her; 20 years in navy; has boy's time to make up to complete time, and has not sufficient time yet as seaman gunner. 4209-4212. Is 35 years old; expects £40 a-year pension on retirement; has been 1st class petty officer since January, 1866, was previously 2nd class petty officer. 4213-4214. Has been chief gunner's mate since he first joined "Monarch." 4216. Messes on aft part of lower deck in place bulk-headed off; mess consists of four artificers, schoolmaster, chief boatswain's mate, chief gunner's mate, and two boys; during first part of commission master-at-arms, ship's steward and writer were also in mess. 4217-4222. Ship's steward and writer now mess in berth below; master-at-arms in own cabin; four artificers in mess during commission, great inconvenience arising therefrom. 4224-4225. Is responsible for cleanliness of mess; has not sufficient time to attend to duties on deck at same time; had proposed to members of mess to take turns in cleaning and cooking, artificers refused, and were supported by engineer in charge. 4226-4229. Had two boys from training ship to attend to mess, knew nothing about cleaning and cooking; on Saturdays, when mess should have cleaning, were absent on deck; on coming to write in mess finds artificers in working clothes on the lockers, and if all three are there no one else can get in; executive chief petty officers understand requirements of mess, artificers bring all sorts of notions into, and do not think him justified in correcting irregularities, and feel a cloth coat and a blue shirt do not agree, and think they ought to be separated. 4226-4227. Does not think chief petty officers object to mess with schoolmaster. 4228. Thinks artificers improve after service; one of five years' standing messes with, is willing to assist, and nobody objects to him. 4229. Thinks boys might in time be taught all cooking and cleaning required; in "Monarch" boys excused for mess till nine a.m., always in mess at meals, bring in dinner and get their own with them. 4230-4233. Artificers object to food, do not think it is good enough for them; this is found disagreeable in mess in a pecuniary sense. 4234. Scrubs own hammock, artificers generally pay another man to do it. 4235-4237. Three out of the four artificers in ship single men; thinks artificers should be separated from lower deck; they want a

servant; leading stokers who have mess on deck below mess-deck have stoker excused to look after it. 4238-4240. There are two small messes on deck below mess-deck; one of them artificers messes in last commission; artificers having learnt a trade feel independent, and are recognised as being in a superior position by seamen; are well educated, no fault to be found with them personally; average age 25 to 30. 4241-4244. Chief petty officers do not think men should be introduced into mess as chief petty officers at once, and that schoolmaster of 19 or 20 should have same position at mess as men of 40, with 30 years' service. 4244-4245. Does not remember to have served with schoolmaster who was son of seaman; thinks the police inclined to favour artificers more than other chief petty officers of equal rank. 4246-4247. Does not think master-at-arms in "Monarch" acts unfairly towards artificers; thinks his own mess good, being well lighted and ventilated. 4248-4249.

GEORGE COOK, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Not satisfied with their practical training in dockyard; a great number who come into service are not efficient as far as practical abilities are concerned; admits improvement has taken place. 4320-4322. Practical work has improved since 1873; if system be properly carried out they will have better opportunity of becoming good practical engineers than they would in a private firm; has seen students come board ship with a party of men, and not do practical work themselves, but not of late years. 4323-4327. Aware are entered by competitive examination; does not think social class from which they are drawn is satisfactory, thinks Admiralty should nominate; would not pay them for first two or three years. 4328-4330. Would pay if could be obtained of better social position; reason for not paying to raise social position. 4331-4332. Could not venture opinion about mess for in dockyard, and whether it would be advisable to put under discipline at first. 4333. Opinion they were not properly trained referred to exceptions; has always found amongst staff efficient practical engineers; would be advisable to allow articled pupils in large engineering firms to compete with students. 4336-4338.

Engineer Officers.—Has served nearly 30 years; was made a chief engineer 11 years after entry; age 55 next birthday. 4253-4257. Counts 24 years for retirement, losing nearly six years, third engineer's time; retirement about £305 a-year; thinks engineers are only class of officers whose time does not all count. 4258-4260. Does not receive retirement according to scale as he was ten days over 25 when he joined; if all time counted should get maximum. 4261. Was promoted to chief engineer, over a great number, for the Baltic, general service of engineers at that time about 13 years. 4262-4264. Does not think promotion is satisfactory at present; to improve would employ a great number of chief engineers in ships of from 700 to 800 indicated horse-power. 4306-4307. Number of engineers in junior branches might be reduced by introducing proper class of artificers; had nine engineers in "Inconstant," with reduced number of engineers would have for her five engineers, and five to six engine-room artificers, after latter had got accustomed to ship and been in service some time; would never think of having artificer in charge of the watch. 4308-4311. An officer should not be over 40 when promoted to chief engineer; youngest age 30 to 32. 4312-4313. To reduce list would employ chief engineers in smaller ships and retire engineers down to 500. 4314-4315. Present scale would not induce engineers to go; suggests 6d. a-day for every year's service; younger ones would go if left to their option, so many openings for them; they came into service under impression of being promoted in a reasonable time, and experience gained is of great advantage in procuring employment. 4316-4319. Young engineers are much better workmen than engine-room artificers; as a rule gave anything particular on board ship to an engineer to do; if good fitters were obtained does not see why they should not be able to do anything required, still it would be necessary for an engineer to do work at times. 4334-4335. Not an advocate for taking into gun-room mess unless social position is improved; engineers ought to go into ward-room after five or six years; in small ships would do better at general mess; difficulty on score of expense would be met by increase of pay. 4340-4342. Chief engineers in small ships could not object to keep watch if necessary; there could be no difficulty about it, does not think ever heard question raised before. 4343-4345. Pay of engineers not being increased for

some years are naturally dissatisfied, also with want of promotion; assistant engineer on entry is adequately paid, after confirmation would give 8s. a-day, and progressive pay up to 14s. or 15s. a-day. Two chief engineers might be put in large ships to give promotion; has been told it did not answer; two paymasters and two doctors get on, does not see why chief engineers should be an exception. 4346-4348. Pay of chief engineers not satisfactory, ought to commence on 15s. a-day, and rise to 24s.; that of inspectors of machinery should be increased; inspector of machinery of fleet ought to get as much as paymaster (£1 18s. a-day), is quite as important. 4349-4354. Pay of some engineers in merchant service about £20 or £25 a-month; speaks of P. and O. and West India Mail Companies; thinks class is socially as high as in service. 4355-4357. If pay, taking into consideration relative ages at which engineers are promoted, was assimilated to other branches of the service, believes it would give general satisfaction. 4358-4359. Has read "the case of the naval engineers"; does not agree with beginning at 9s. 4360-4361. Would never do if number is to be reduced to let engineers go without some guarantee they could be called on if required; in case of war 500 engineers would soon be swallowed up; during Russian war one of the engineers then entered served with him, receiving £16 a-month, when he had £12; never kept a watch, behaved so badly was sent forward and messed with stokers, was not worth his salt. 4372. Does not know whether greater inducements could be held out to mercantile engineers, they appear to object to join reserve; if they came into service they would be lost if put into ironclads; would have to understand discipline and routine, and know water-tight compartments and anything wrong with guns; might be put into another class of ship. 4373. Plan on which engineers of the American navy are brought up not bad, thinks system is not capable of much extension in case of war; does not see the way out of the difficulty with regard to supply of engineers for our own service in case of emergency; if certain number would join reserve it would be very well. 4374-4376. Would rather have reserve accustomed to men of war than from mercantile marine or private trade. 4377. Reason why senior chief engineers do not wish to be promoted to inspectors of machinery is because they would have to serve longer, pay would not be more, and they would have to be on half-pay 12 or 18 months; expressed wish not to be promoted himself. 4386-4387. Has a son; put him into another profession already, should have made an engineer if he could have seen his way clear. 4388-4389.

Engine-Room Artificers.—Had two in "Inconstant"; boiler-makers were pretty fair men; not competent to take charge of a watch in engine-room; had never been in engine-room, always sent into stokehold; should have been sorry to place an artificer in charge of a watch in engine-room in one of the large ships in Channel Squadron. 4265-4270. Has been with artificers whom he would consider competent to take charge of a watch in a small ship, but not in a large one. 4271. One fitter engine-room artificer in "Royal Alfred," and two in "Duncan," were fair but not first-class men; has come across good men in service, but majority are not what he considers they ought to be. 4272-4274. Does not consider pay is sufficient to induce good men to enter; ordinary trade price for mechanics in London about 6s. a-day, and they can go to homes from Saturday to Monday; to get men service ought to have, pay will have to be raised beyond that on shore. 4275-4276. Fitter in private trade receives 36s. a-week; an engine-room artificers 40s. 3d., but mechanic on shore can work overtime; extra day's pay is not sufficient for having to work on board ship at any hour. 4277-4281. Pay ought to commence at 6s. a-day, increasing progressively, 6s. 6d. after one year, 7s. after five years, 7s. 6d. after ten years, 8s. after 15 years, 8s. 6d. after 20 years; thinks would induce men to enter and remain, and if certain alterations regarding comfort on board ship were made; there is a feeling amongst best mechanics that a man disgraces himself in consequence of having to do menial duties. 4282-4283. Suggests they be taken away from stokers, and have place where they could wash; grievances more a great deal about comfort than pay; if practicable ought to mess by themselves, and be away from petty officers; master-at-arms and ship's corporals ought not to have so much power over. 4284. As regards leave in "Inconstant" during first part of commission were compelled to go through ordinary routine, but when Captain Waddilove came it was altered and worked admirably; cannot be spared sometimes when leave is given to ship company, and when work was done difficulty was raised about leave; has known instances

when they have not gone on shore at all. 4284*. General mess for all chief petty officers in "Inconstant" did not answer; artificers complained of food and of having been found fault with about mess not being cleaned. 4285-4286. Paid man for scrubbing hammocks out of their own pockets, but were responsible still; there was no difference between stokers and their washing arrangements, there ought to be. 4287-4289. Never heard complaints about uniform; has about chests, which were ordered to be cut down, and artificers said they did not know what to do with their clothes. 4290-4293. Pension is an inducement for them to join, but not a sufficient one; it is not enough, ought to commence at £50 and go to £80. 4294-4298. Would not make warrant officers; are wanted to work on board ship as mechanics work on shore, having a number of men under their control; a slight alteration in uniform beneficial, would give them a frock coat. 4299-4302. If mustering and inspection were more under chief engineer it would work better, and save unpleasantness. 4303-4305. If class were improved would never think of having in charge of watch in engine-room. 4310. Thinks must have some rank to enable them to take command of stokehold; would prefer good pay, but can hardly answer question as to whether they would prefer it to relative rank. 4362-4364. Percentage in navy should be, fitters 60 per cent., boiler-makers 25, and moulders, pattern makers, engine smiths, and copper-smiths 15 per cent.; fitter is worthy of more pay than a smith artificer. 4365-4369. Believes majority are single men, and their inducement to go to sea is the desire to see foreign countries; with married men pension might be the inducement. 4370-4371. A certain number might be trained for watch keeping purposes to be as efficient as engineers in case of war, but as already stated should have strong objection to placing in charge of a watch in a ship in Channel Squadron. 4378. Could be trained and made efficient to take charge of the double-bottom under senior engineer. 4379-4382. Proposes should get permission of chief engineer, and then they, or senior engineer, should ask for leave from commander direct; has seen ship's steward, master-at-arms, and writer go direct to commander for leave. 4385-4385. Having two or three weeks' leave and being paid for Sunday perhaps an inducement for them to join; as a rule on joining do not appreciate pension, certainly not sufficiently to induce re-entry after ten years; those who rejoin will be of little use, best men will go. 4390-4391. Would prefer taking from outside and not making from stoker mechanics; good workmen ought to be obtained for pay suggested. 9432.

In General.—Now serving in "Royal Alfred"; last sea-going ship the "Inconstant." 4250-4252. If complement of engineers is reduced thinks a writer should be appointed to assist chief engineer in keeping books. 4378.

MR. JAMES MERCER, ENGINEER, R.N.

Engineer Students.—Nomination by Admiralty would be an improvement; if were entered by nomination thinks training on present system not sufficient, should have more instructors, and be looked after better; time in boiler shop, copper-smith's and smithery lost, would be better to devote to erecting. 4413-4415. Government ought not to educate; they should pay for learning profession as he had to do; if paid ought not to expect anything for first three years, and then merely a nominal sum. 4439-4440.

Engineer Officers.—Entered service in 1863; prospects since have altered very much; expected to be made a chief engineer in 11 to 12 years; no hope of being promoted at present rate of promotion; age would not allow; is 42. 4395-4403. Served at Woolwich arsenal before entry. 4402. Grievances, slowness of promotion, want of progressive pay and better retirement. 4404. Would give assistants increase of pay every three years until they reached 12s. a-day, promoting to chief engineers as soon after that as possible; age on promotion not to be more than 35, and should then have 14s. a-day. 4405-4406, 4451. Pay should commence at 7s. 6d. a-day to get people that are required in service; thinks with progressive pay, quicker promotion, doing away with engineers' mess, and allowing all time to count towards retirement, it would induce a higher class to enter. 4407-4409. Thinks if things remained as at present 1s. 6d. a-day extra would induce a higher social class to enter; would extend examination to outside. 4410-4412. Served time at a private firm. 4416. Would reduce number of engineers and put engine-room artificers in their places; retiring allowance for

engineers to be about £8 for every year served, but 6d. a-day for every year's service would better satisfy. 4417-4420. Engineers below first 20 or 30 would go, not fair to allow those who had passed through Kensington or Greenwich to do so. 4421-4423. Believes many engineers at top of list have not qualified for promotion as they cannot get time in to obtain good retirement. 4424-4425. Thinks it right in course of time to do away with engineers' mess berth; would do away if engineers were obtained from a higher social position, and they should mess in ward or gun-room according to service. 4426-4428. Not desirable socially to immediately put present class into gun-room; does not think there would be complaints about expense of messes if class were improved socially. 4429-4431. Would let time for retirement remain as it is after list was reduced by some temporary measure; has 13 years for retirement, only entitled to £78 a-year; at 45 will get £100, and only £30 more at 50; if promoted to chief would lose about four years for retirement. 4432-4435. If pay were assimilated to that of other branches holding similar rank does not think engineers would be satisfied; they have more responsible and unhealthy duties to perform, and under certain though not ordinary circumstances are to an extent in a more responsible position than officer who commands or navigates the ship. 4436-4438, 4448. Has seen "case of the engineer officers"; does not agree with in all particulars, it goes rather too high. 4441-4442. Thinks pay mentioned to satisfy engineer officers would average more than ordinary rate for officers of relative rank; in fixing considered promotion as he hoped it would be. 4443-4444. Has not passed qualifying examination for chief engineer, opportunities being limited and seeing no chance of getting higher step; did not expect to have to pass a severe examination for that rank when he entered, came in before circular of October 1863. 4445-4447. If pay commenced at 7s. 6d., and progressed to at least 12s. a-day, with a prospect of more speedy promotion, engineers would be satisfied. 4449-4450.

MICHAEL HARCOURT, ENGINE-ROOM ARTIFICER.

Trade, an engine smith; between nineteen and twenty years in service; was a leading stoker before he became an artificer. 4552-4455. Belongs to "Sultan"; messes on engine-room flat; pretty good mess place now; mess by themselves; four in mess. 4455-4460. Stoker partly excused to clean mess; sometimes not satisfied with mess arrangements, stoker cannot be spared, and food has not been cooked; only one stoker, but he is sometimes shifted; one is put on sick duty, he cleans mess and messes with artificers; would improve arrangement if stoker were excused from all other duties to attend on. 4461-4469. Sleeps on engine-room flat; likes mess very well as it is at present; stoker looks after hammock. 4470-4472. Does duty in stokehold watch at sea. 4473. Three artificers besides himself, they have only just joined and never been to sea before; are rather awkward in mess at present, expected better accommodation; are not satisfied with mess, thought they would have a mess berth. 4474-4480. Are at present satisfied with pay, but think it should increase as they get on. 4481. If want leave in "Sultan" write name in chief petty officers' leave book with date and hour of leaving ship and returning; book is signed by commander in the evening; has worked satisfactorily. 4481-4483. Do not report on coming on board, would soon find out not coming on board if absent from duty; on Sunday muster in front of stokers; inspected by captain and officers. 4484-4488. Artificers who have just entered not satisfied with prospect of pension; think should have a little consideration, as pension now is same as that of chief petty officers; rank with the latter, but no difference in pension. 4489-4491. Only artificers can obtain whole of pension; if they behave well count time from day of entry. 4492-4493. Pays stoker 4s. a-month to look after hammock; wash with stokers, it is inconvenient; does not take so much notice of having hammock and so on as much as others, having been so long in service. 4492-4497. Master-at-arms has nothing to do with in "Sultan"; personally satisfied with messing arrangements, if man in attendance were excused from all other duties; wants a servant; no servant in chief petty officers' mess. 4498-4501. Two stokers in each watch would not obviate difficulty; had in "Devastation," but it did not answer, as men had own work to do below. 4502-4503. Does not know where artificers got idea of having separate mess berth; has not known executive chief petty officers interfere with artificers, aware there is ill-feeling between them. 4504-4507. Ill-feeling caused by artificers on entering being unacquainted with ship rules and little

matters of discipline; has sometimes found artificers unreasonable in their difficulties, do not sufficiently consider that everything on board must give way to discipline; might have been a greater give and take principle on both sides. 4508-4510. Pay to get good practical and steady fitters and smiths should be 5s. 6d. or 6s. a-day on entry; another 1s. a-day after five years, and another 6d. a-day after ten years. 4511-4514. Men who enter from the shore do not take pension much into consideration, but attach most importance to pay and messing; messing the chief difficulty. 4515-4517. Would prefer to mess by themselves and be under chief engineer, rather than to be as they are and have relative rank with other chief petty officers. 4518. Ordinary ships' smiths on entry not quite worth so much as first class engine smith, boiler maker, angle-iron smith or fitter; ordinary smith worth about 6s. a-day, but good engine smith equal to any man; many inferior workmen get into service as artificers. 4519-4521. Would not consider that ordinary smith should have same wages as thoroughly good engine-fitter or boiler-maker. 4522.

MR. MATTHEW BLANK, ENGINEER, R.N.

Engineer Students.—Practical qualifications indifferent, does not think are good workmen. 4551-4554. Social position not satisfactory, decidedly wrong; engineers of opinion it is intentional, gives an excuse for not allowing social distinction to which they aspire; would be obviated by students being nominated by the Admiralty. 4555-4559. More attention should be paid to entry of; physique at present time very low; impossible for them studying as they do to have proper physique. 4579-4581.

Engineer Officers.—Serving in "Victoria and Albert" as senior engineer; sixteen and a-quarter years in service; was seven years before he became an engineer. 4523-4526. Served apprenticeship at Great Northern Railway. 4531. Was told on entry he would be promoted to chief engineer in ten years; has prospect now of being in four years; will then be 43. 4527-4534. Suggests, as all eligible men cannot be promoted, engineers over five years' standing should count time for privileges on promotion or retirement; engineers when promoted to commence on pay due to service. 4535-4539. Necessary to reduce number, but chief engineers would not be willing to undertake responsibilities with present class of engine-room artificers; if a more efficient class of the latter were introduced, then number might be reduced. 4540-4544. Considers about 30 a fair age for promotion to chief engineer. 4545-4548. Is committed to scheme of pay (case of the naval engineers), but lower grades might be retained, entering at 7s. 6d., making it possible for superior students to come in at next step; education at public expense is taken into account, efficient engineers from outside could not be obtained at 9s. a-day. 4549-4550. Wish of all, it would be in the interest of service to retain, to mess in ward and gun-room, but pay is not sufficient now—it is only starvation. 4560-4562. Pay 10s. a-day; has been senior engineer of the royal yacht, with all the responsibilities and nothing extra for it. 4563. Pay to be in increasing ratio, as in "case of the naval engineers" altering pay on entry to 7s. 6d.; after seven years' service an engineer would receive 15s. a-day, but would scarcely like to confine himself to that, as money will not go so far as it did. 4564-4566. Engineers, as a rule, join service for a living, and give up comforts of being on shore; other officers join for honour and glory; as duties and responsibilities are increasing, goes in for money's worth; no class of engineer officers sufficiently paid. 4567. Does not think could get higher pay if discharged at once, many being physically unfit; several senior engineers and junior chief engineers not fit to serve, the result of climate and work increasing. 4568-4569. Half-pay of chief engineers, considering service, is altogether disproportionate; scale in "case of the naval engineers" what it ought to be; knows case of extreme hardship of a chief engineer being kept on small half-pay. 4570-4572. Represents a large class of engineers who do not owe education to the Government; thinks ought to have some substantial recognition of services and remuneration for loss of promotion; those who have been unable to qualify under Circular of 1863 should have retirement of 6d. a-day for every year's service; those who have passed the test, and are detached from promotion by age or other circumstances, should have after twenty years' service not less than £200 a-year. 4573-4578. Thinks chief engineers not being able to count junior time until they had served eleven years is decidedly bad. 4581-4582. Senior engineers in ships who have extra responsibilities should receive extra pay. 4582-

4584. Employment in steam reserve on manual work is very unprofitable; an engineer should most decidedly be capable of doing manual work, but ought not to be expected to do it, except in cases of emergency, being otherwise a superintendent. 4584-4588. Expected to take charge of torpedoes and guns; have no instruction in construction of a ship, engineer students have, but engineers coming forward for promotion know nothing about it; advises instruction in, and in the chemistry of boiler preservation. 4589-4591. Thinks senior engineer should have a cabin; sees difficulty in appropriating cabin for three seniors; hardships and difficulty will be less when number is reduced and promotion more rapid. 4591-4594. Seniors generally have a cabin; senior had one in "Hercules"; thinks have not in "Minotaur"; in "Bellerophon" believes they have duplicate cabins. 4595-4597. Mr. Childers' circular gave great offence in putting engineers after warrant officers, and taking them away from officers of their own rank; engineers wish to be retired, not pensioned, and to be retained in Navy List. 4597-4601. Considers engineers have been reduced in ships; "Bacchante" had six, and number was reduced to four; she has two artificers in lieu of junior engineer. 4602-4603. Might do away with rank of second-class assistant-engineer; chief engineers might be increased and employed in smaller vessels, they would not like to keep watch, but does not think would object. 4604-4607. Question of getting engineers in time of war a matter of pounds, shillings, and pence; during Crimean war paying second engineer, obtained temporarily, £16 a-month, while chief engineer only received £12, was done in ignorance; quite believes men then obtained were utterly inefficient. 4608-4610. It should be a subject of study to find out where engineers are to come from in time of war; it is proposed to improve position of engine-room artificers, and believes there would be no lack of it if money be certain; majority of retired engineers physically unfit; would only be worth having for home service. 4611-4613.

Engine-Room Artificers.—Pay to induce thoroughly good engine-fitter to enter should not be less than 6s. a-day; small increases quickly better than large slowly; maximum pay should be 8s. or 9s. a-day. 4614-4616. With pay proposed, pension now sufficient, but in a few years it would not encourage a man to come in; boatswain's mates and similar people receive £45 a-year now; does not say it is too much, but a mechanic who has his trade is independent. 4617-4620. Considers could look to for any sudden expansion in event of war; would not like to be sent to sea as a chief engineer with one engineer and rest of department present engine-room artificers; would not mind with the ones he hopes to see in service. 4621-4623. Suggests should be equal, excepting educational test, to engineers who joined before entry of engineer students; would give them money instead of rank. 4623-4625.

WILLIAM BARRETT, ENGINE-ROOM ARTIFICER.

Over four years in service. 4626, 4651. Has served in "Black Prince," "Ringdove," and "Thalia"; is now serving in "Excellent." 4626-4628. Drives engine of first launch; messes with chief petty officers; mess exceptionally comfortable. 4629-4632. Messed in "Black Prince" with chief petty officers on lower deck; not comfortable there. 4633-4634. Messed in "Thalia" in blue jacket chief petty officers' mess; master-of-arm, ship's steward and schoolmaster each by himself; was very uncomfortable 4635-4636. In "Ringdove" messed with corporal of marines, ship's steward, chief gunner's mate, chief carpenter's mate, and ship's cook, not comfortable; has pleasanter time in present ship than ever before. 4637-4639. Previously worked as angle iron smith in Portsmouth Dockyard, also in Wiltshire, and London; is by trade an engine-smith. 4640-4641. Artificers wish to be more comfortable, would like to have separate mess; if only one on board it would be better to have separate mess from blue jackets on lower deck; should not himself wish to mess alone, but to be distinct from lower deck. 4642-4643. Does not object to mess with blue jacket chief petty officers. 4644. Pays, as a rule, 4s. a-month to man to look after hammock; has no hammock in "Excellent." 4648. Would like large-sized chest; separate compartment for dirty clothes; size of chest on entering service 3ft. 4in. by 2ft. 2in., same size adequate to present wants. 4648-4650. Will depend upon being better paid and made more comfortable whether will re-enter at end of 10 years. 4652. Present pay insufficient, considers himself worth 7s. 6d. a-day; was earning 5s. a-day before entering service when trade was bad; received 5s. a-day on entry,

and 5s. a-week extra, but had to work on Sunday. 4653-4657. Has had to pay considerable amount to get necessary food on board; has not had to pay so much on shore, but has greater advantages there, can get overtime, and has piece work; thinks mechanic in private shop has equal advantages with artificer, supposing latter was getting 7s. 6d. a-day after five years' service. 4658-4659. Though lost pay on shore when on leave, yet had advantage of being at home at night; on board allowed on shore only one night in three. 4660. Thinks pay on entry should not be less than 5s. 9d. or 6s. a-day to get thoroughly good mechanics; after five years should be 7s. 6d., after which should increase according to ability. 4661-4663. Thinks 8s. 6d. fair pay after 10 years and for remainder of service. 4664-4665. Does not think artificers would approve of remaining till 50 or 60 years of age in hope of being made warrant officers. 4666. Thinks pension, though not very great, induces many to enter; regulations state it is the same as for chief petty officers, about £58 a-year. 4667-4668. Was nearly 26 on entry; thinks after 20 years should get two-thirds pay as pension if character is good. 4669-4671. Thinks £100 a-year too high, but £75 a fair pension. 4672. Would like more suitable uniform; thinks jacket unbecoming to men; would like a coat, thinks reefer would do. 4673-4676. Will be 31 in two months; would like to be placed out of control of master-at-arms; has been at times promised leave when finished work, master-at-arms placed obstacles in way and refused to ask commander; thinks permission of commander should be obtained without master-at-arms having power to do so. 4678-4679. Leave in "Excellent" obtained through master-at-arms; no difficulty; everything very comfortable. 4680. In "Thalia" after he had obtained leave from chief engineer had to wait till master-at-arms chose to see commander. 4681-4682. Received 3s. a-day check money in "Frolic"; got 8s. 9d. a-day, working 10 hours; was a case of emergency, "Frolic" under orders, and boilers leaking badly. 4683-4689. Has weighed advantages of service, viz.: pension, payment for leave, ration money, free attendance from doctor and payment for Sundays, but would rather be on shore. 4690. Has been married eight years. 4691-4692. On board, hours not so long, nor work so hard as on shore, but not so much "humbug" in private firm as on board; cannot go on shore when he wishes, and gets extra pay for extra work on shore. 4693-4695. Thinks increase of pay with more comfortable mess would compensate men; would like some provision for widows as in case of warrant officers; insuring life does not always answer, offices break sometimes. 4696-4697.

WILLIAM WALKER, ENGINE-ROOM ARTIFICER.

Has been sixteen years in service; was leading stoker before he became artificer; by trade a fitter. 4698-4700. Is serving in "Asia"; was at sea in "Immortalité" during last commission, only sea-going ship has served in as engine-room artificer. 4701-4705. In "Immortalité" messed forward in second mess on starboard side with schoolmaster, not very comfortable. 4706-4709. Only one other artificer on board; discomfort arises from having to clean mess. 4710-4711. Would like separate mess-place from rest of ship's company; does not like to mess with other chief petty officers, would rather mess alone. 4712-4714. Has no mess in "Asia"; lives on shore; pay 5s. 9d. a-day; is now completing last ten years' service. 4715-4718. Artificers generally not contented, not satisfied with pay; would be satisfied with more pay on entry, rising continuously after certain number of years. 4719-4721. Would start on 6s. a-day; should increase to 7s. 6d. in five years, with 9s. for remainder of time up to ten years. 4722-4723. Making warrant officers not an inducement, pension is an inducement for men to enter, but not so great as present pay. 4724-4725. Does not think there are many positions in private firms so good in pecuniary way, but more comforts at home. 4726. At present at home, but may be called upon to go to sea tomorrow; has been over twelve months in present position; is now employed on Whitehead torpedo, has been given to understand will not be called upon during remainder of time. 4727-4731. Expects same pension as chief petty officer; has not calculated it; has only about ten years' petty officer's time. 4732-4734. Chest is too small. 4735-4736. Artificers think jacket not proper outer uniform; should have dress-coat for mustering, and reefing jacket for undress. 4737-4738. Kept watch twice in "Immortalité" when at sea, in charge of engines, by order of chief engineer. 4739-4741. Two or three times a-week had charge of engines in "Comet" gunboat while engineer was in hospital. 4739-4740. Feels competent to take

charge of small pair of engines; attributes going to sea as stoker to foolishness of youth, being fitter by trade. 4743. Served apprenticeship as fitter; was nearly 20 when went to sea; had been at trade for five years before. 4745-4746.

MR. JOHN B. STEVENS, ENGINEER, R.N.

Engineer Students.—Is aware boys are taken from any class of society, position being thrown open to competition; quite sees difficulty of admitting them to gun and ward-room messes; would not propose alteration should be made at once. 4845-4847. Desirable candidates should be nominated by the Admiralty. 4849. Should go on every trial trip to gain experience; a vessel might be appropriated for them to learn working of machinery; would be better to attach to ship for six months to gain experience than to keep in reserve. 4918-4919.

Engineer Officers.—Has been ten years an engineer; entered service in 1858 from Lancashire before engineer students were established; at the time was draughtsman in a consulting engineer's office. 4749-4751. Qualified for chief engineer after he was made an engineer; obtained necessary education at school and from lectures; attended the college at Portsmouth while in "Osborne," and when serving time went to private school in the evening. 4752-4758. Never expects to be made a chief engineer, 44 years of age; entered service at 26; does not know whether he can retire at 45, having qualified for chief engineer; if he cannot retire before 50 is sorry he qualified. 4759-4764. Promotion is not satisfactory, to improve would increase chief engineers and employ in smaller ships; suggests some scheme of retirement for those who cannot be promoted. 4785-4787. Step in rank on retirement not an inducement for men to go; entitled to £108 a-year on retirement; would go if allowed; a large number of engineers profess to be anxious to go; thinks if all over 40 were allowed a certain scale of retirement a large number would. 4788-4796. Could get employment as chief engineer in merchant service or in mercantile life on shore. 4797-4798. Regulation binding engineers retired to serve again in time of war would be a great check to retirement; they would be glad to serve, but such a condition would interfere with their obtaining employment, and be a bar to them; thinks liability of being called away from work has something to do with small number of engineers entering naval reserve; would consider matter if he had to go on such terms, it would seriously affect position. 4799-4806. To improve promotion would allow engineers to retire, increase number of chief engineers and their retirement, and reduce number of entries; increasing engine-room artificers and reducing engineers in each ship would be good for service. 4807-4809-4843. Has had some good practical engineers who have been engineer students. 4810-4811. If engineers be reduced in ships, young engineers should have facilities of learning management of engines while students; they know something through going on trial trips. 4842. If engineers' mess were abolished, and engineers messed in gun or ward according to rank or length of service, it would add much to their comfort; with present class of students entered sees difficulty, and would not propose alteration be made at once. 4843-4847. Complement for "Triumph," engineers being reduced and artificers increased, two chief engineers, one for duty with propelling force, the other for all work outside engine-room; three engineers for watch-keeping, and six engine-room artificers; thinks arrangement would work if duties of the chief engineers were defined, and engineer were given a better position with regard to ship's company and other affairs of the ship. 4864-4869. Not satisfied with pay, there should be an increase, promotion at an earlier age would meet difficulty; is 44 years of age, and has £180 a-year; takes credit for rations and prospect of pension, but one does not work until 50 for a pension of £100 a-year; thinks if skilled men were wanted, and were offered in London market 6s. a-day, with prospect of receiving £180 a-year at end of twenty years' service, after having been exposed to dangers of sea life, there would be difficulty in getting them, and they would not be such efficient men as the Government ought to be able to command, even though at end of time they could retire on £100 a-year. 4870-4872. When he entered expected to be made a chief engineer in ten years; should have been satisfied had he been promoted in that time. 4873-4874. If offered promotion to chief engineer or present retirement, should go at once, even if allowed to count junior time. 4875-4876. If gun and ward-room messes were thrown open to engineers, many would object to expense,

but increase of pay was asked for; juniors might commence on 7s. a-day, and pay should be progressive. 4877-4878. Has four years' time as second assistant; derives no benefit from Dr. Woolley's certificate; and there are so many before him cannot expect promotion. 4879-4880. An engineer should be promoted to chief between 32 and 40; 35 would be most efficient age. 4881-4882. If were promoted at 35, and pay were assimilated to that of other officers of relative rank, thinks there would be a feeling of satisfaction, and it would be an improvement. 4883. Feeling that engineers' mess should be done away with not universal; majority and better men are in favour of, something being given to meet expense. 4884. Aware more young engineers are married than any other class; simply their own folly, and other young officers have not the same opportunities. 4885-4886. Thinks education and practical training received as students fits them on entry for gun-room; no reason why they should not be under as perfect control there as in engineers' mess at the college, which was as well conducted and orderly as any gun-room mess at sea; aware of class from which they come, and change should not be made at once; knows, speaking of fifteen or sixteen years ago, of warm attachments springing up between members of engineers' and gun-room messes; there is a strong *esprit de corps* amongst young engineers to make themselves worthy of the gun and ward-room messes. 4887-4890. Recommended one chief engineer should look after water-tight doors, and have a staff to assist; would take position sooner than not be promoted. 4911-4913.

Engine-Room Artificers.—Keep watch in stokehold in "Triumph"; three are engine-fitters, one a boilermaker; two of former and the latter keep watch; the other engine-fitter stands off for any necessary work; do not assist to keep watch in engine-room; are all confirmed, and three of them have taken charge of an engine-room watch in small ships. 4774-4784. Thinks if they took the place of young engineers, and were under efficient supervision, repairs would be as well carried out. 4812. Would enter chiefly engine-fitters, a percentage of boiler-makers, and a small number of coppersmiths or engine-smiths; most of the latter can do a little smith-work, but a boilermaker is not necessarily a fair blacksmith. 4813-4817. Suggests better understanding about their cleaning messes and scrubbing hammocks, and should be relieved from jurisdiction of master-at-arms; they object to jacket, would prefer frockcoat. 4818-4820. Better pay will obtain better men; of thirty he has known, all, with exception of one boilermaker, were good men. 4821-4834. Good men obtained from both Government factories and private trade, but a more judicious selection perhaps better; would be wise to give progressive increase of pay; thinks will re-enter after ten years under present regulations. 4825-4-828. Can hardly say whether it would be desirable to divide into two classes; would depend on way classification was made; there would be same means of ascertaining whether fit for promotion as with other classes. 4829-4830. Advisable to check entries; there should be some selection, greater number to be engine-fitters, and smiths limited to engine-smiths; so long as there are good blacksmiths in the ship would exclude them from rating of engine-room artificer. 4850-4853. Comparing pay with that of good workmen on shore, it appears to be low, but should not like to fix what it should be. 4854-4855. When called on to work in other ships than their own receive extra pay. 4856-4859. Being paid for seven instead of six days a-week not an inducement to enter; even then pay of 35s. a-week would only be wages of a skilled mechanic, who has every night at home, and is not liable to be sent abroad; giving credit for value of rations and pension pay is hardly sufficient to get as good men as would be for benefit of service to obtain. 4860-4861. Not heard complaints about pension, do not think about on entry. 4862-4863. Not desirable to make warrant officers. 4891-4893. Complaint about discipline partly on account of their not understanding ways of service, being new to it; generally because master-at-arms bullies them. 4894-4896. Does not think master-at-arms attempt to over-ride executive chief petty officers, but they do civil ones. 4897-4898. Hardly competent to judge whether should mess by themselves, and be more under immediate control of chief engineer, and would not suggest he should have anything to do with messing. 4899-4900. Mess place should be under mate of the lower deck; where master-at-arms is mate of lower deck, they should be responsible to commanding officer; in ships like "Liffey" mess might be under senior engine-room artificer and inspection of officer who goes rounds. 4901-4904. Mess in "Triumph" in boiler-room flat—stokers on one side, bandmen and chief petty officers on the

other: ship's steward, writer, master-at-arms, and school-master mess separately; believes there is dissatisfaction with mess-place. 4905-4909. Would have to keep watch in ship like "Triumph" if one of the three engineers proposed for fell sick; if better class were obtained would be qualified to do so, would never allow if there were an officer. 4914-4917. One who had been in charge of engines in a small ship as capable of taking charge of engines of "Triumph" as a student just out of his time. 4920.

In General.—Is senior engineer of "Triumph," 800 nominal horse-power; keeps watch; she has six engineers, including chief, and four engine-room artificers. 4765-4773. Chief engineer is responsible for double-bottom, sluice-valves, and cocks; junior engineer is appointed by to look after, and he is assisted by an assistant engineer on duty with double-bottoms and water-tight doors. 4831-4838. Assistant engineer has charge of small auxiliary engines. 4839-4841.

L. ENNIS, ENGINE-ROOM ARTIFICER.

Is serving in "Waterwitch"; by trade an engine-fitter. 4921-4922. Learnt trade at a commercial foundry in Jersey; it was a machine shop, and they had both brass and iron foundry, did fitting work generally for marine and stationary engines; is a Jersey man. 4923-4927. Was seven years there; work was entirely that of engine fitter, only did smith's work so far as to repair a chisel or temper a drill. 4928-4931. Paid nothing for apprenticeship, father being proprietor; usual to pay about £100 on entry as apprentice, from £50 to £100 in Jersey. 4932-4934. After serving time, worked as journeyman at Sharpe & Co.'s and the Falcon Works at Manchester for about one year and nine months. 4935-4938. Joined navy in 1870; was then out of employment; never at sea before; reason for joining, because thought it best opening at the time; is married. 4939-4943. Has served in "Audacious," "Vanguard," and "Triumph"; had been two years in latter last March; is the senior artificer in her. 4943-4948. There are four engine-room artificers in "Triumph"; being senior, does any duty; when engineer is away, attends to auxiliary engines; has had charge of engines at sea when not sufficient engineers to keep watch on occasion of capture of Spanish ships round Carthage. 4949-4951. Would like service if more comfortable; would like better defined position and more pay; by defined position means as regards messing and general comfort. 4952-4954. Comfort would be improved by having separate mess, and by being relieved from menial duties; only accustomed to scrubbing mess place since has been in service, never accustomed to it before. 4955-4958. Cannot at present be excused from cleaning mess as other chief petty officers do it; separate mess in "Triumph" on the broadside in one of the flats, six in it including artificers and executive chief petty officers; boy waits on. 4959-4963. Take it in turns to clean mess; thinks boy could do it alone, if so, question of cleaning would be settled. 4964-4966. Master-at-arms has and it is his duty to inspect mess. 4967-4968. Has never belonged to trade's union; none in Jersey. 4970-4972. Increase of pay equivalent to that of ordinary journeyman on shore would induce good men to remain; as services become valuable after time, would be satisfactory if pay rose from 5s. to 7s. after ten years' service; would himself remain with that pay; could get 6s. to 7s. a-day on shore for six days in the week, but in service would be paid for seven days, have provisions, and prospect of pension. 4973-4979. Has had 3s. a-day extra when working in other ships. 4980-4983. Has been in steam reserve, waiting appointment; would be a great boon for artificers to have two or three years in steam reserve after being few years at sea. 4985. Never been with other artificers than those is with now; was the only artificer in "Vanguard" and "Audacious," they being in the reserve. 4986-4987. Likes uniform very well except short jacket; wears serge dress from private kit when working, thinks is the nicest working dress, has never worn another; wore French serge when working on shore. 4988-4993. Chest having been reduced from 34ft. by 2ft. to 3ft. by 1½ft. it is now not large enough to hold clothes; has no locker in mess place, but one in bath-room to hold soap and towel. 4994-4997. After work washes in stokers' bath-room; trouble arises from having to wash in same basin with stokers who are often dirty in their habits. 4998-5000. Thinks would get about £52 a-year after twenty years' service as a pension, does not consider it in fair proportion to pay; should be about 3d. a-day for every year served. 5001-5005. In "Triumph" muster on flying deck, on same deck as stokers, but on

opposite side; do not muster individually, merely fall in. 5006-5008. Pays man 5s. a-month to take charge of hammock, he takes it up and down and scrubs it, but does not wash clothes. 5009-5112. When wanting leave in "Triumph" first asks chief engineer, then commander, does so himself, has nothing to do with master-at-arms; in other ships was compelled to ask master-at-arms, or ask him to ask commander, and he often refused; when returns to "Triumph" reports himself to officer of watch or commander. 5013-5017. When first joined knew little about service; thought that pay being equal to that on shore would after a few years get better; looked forward to pension; want present life to be made more comfortable, would be so if messing arrangements were altered and other grievances dispersed, and it would induce other good men to join. 5018-5020. Has never seen any but engine smiths in service, they are up to heavy forging and light work also. 5021-5022. Artificers would prefer to mess by themselves, not with executive chief petty officers; if not enough accommodation on board would prefer to mess with civil chief petty officers. 5023-5025. Has known jealousy between artificers and executive chief petty officers because artificers on entry rank as chief petty officers and have better pay, but has not noticed it during last year or two. 5026. Ill feeling might be caused because artificers think it derogatory to clean mess out, thinks if matter were settled jealousy would die away. 5027-5028. Has heard brother artificers express wish to become warrant officers, one objection on his part would be having to serve longer; it never struck him that one difficulty in the way of their becoming warrant officers would be their having always to work with their hands, which warrant officers have ceased to do. 5029-5031. Thinks proposed pay and £52 a-year pension, with improved mess, would induce men to enter, pay and alterations in mess more than anything else. 5032-5033.

HENRY W. ELGAR, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Practical test before entry as engineer officers not sufficient; marks should be given for practical qualifications, does not think there would be difficulty in awarding at different dockyards. 5066-5068. Believes could become as good practical workmen as engine-room artificers, if two or three were placed under the superintendence of a good practical man; should have reduced pay for first three years, and practical men should be remunerated for instruction. 5070-5072. Circular of May, 1873, carries out to some extent his suggestions, but leading man having 30 to 40 students to instruct cannot give all his attention to them; more practical men should be appointed to look after, as was the case in early days when students were called engineer boys. 5073-5078. If number of engineers be reduced, and artificers are increased, standard of examination should remain the same. 5079. Entry is open to any one; suggests nomination by Admiralty, would not have open competition; does not wish to lower standard of competition; if nominated candidates from a higher social class would present themselves. 5113-5116. Anybody being allowed to compete deters higher social class from entering; little or no pay should be given for first three years, friends should support; thinks, if desirable to get officers in navy and army, clerks in public offices and others to send sons in as, it would be an inducement to them to do so if they knew students were partially supported. 5117-5119. Would be a good plan to divide amongst leading men, whose remuneration should depend on the practical excellence attained by. 5125-5127.

Engineer Officers.—Pay is 17s. a-day; able to retire optionally in 6½ years; is 43; not 30 when promoted to chief engineer, was promoted before his time for services in China. 5047-5053. For the good of the service a man should be promoted to chief engineer at 32, or not later than 35. 5054-5135. Promotion is decidedly unsatisfactory, would improve by gradually reducing engineers and increasing engine-room artificers; would reduce in proportion to number in ships as skilled artificers are obtained to take their place. 5055-5057. Would reduce number of engineers by giving good retirement, at least 6d. a-day for each year served, they would only be too willing to go if retirement came up to 9s. a-day. 5058-5059. Present scale of retirement enough for chief engineers, many would go if they could count all junior time. 5060-5061. No particular disinclination on part of to work on repairs to engines; juniors, except in a few instances, not able to perform work. 5064. Considers average engine-room artificer better workman than young engineer, qualifications of the latter are too theoretical; there are

exceptions, as he has had very good practical engineers who have been students. 5065. There should always be highly educated engineer officers, whatever number of engine-room artificers may be. 5069. Pay of an inspector of machinery should be 30s. a-day, of a chief inspector 35s. a-day; aware many chief engineers have declined to be made inspectors, reasons are that maximum pay now is about the same, and they would have to serve a longer time before retirement. 5136-5139. Agrees with views in "case of the naval engineers," with exception of pay, as they are not likely to get it; advocates more moderate rate; but with increased responsibility given in ironclad ships, thinks it is not too much to expect. 5140-5141. Has been on half-pay, last time for five months; does not consider it adequate, it is 12s. a-day; counts all junior time allowed, has three years which he is not allowed to count. 5142-5146. System of promotion by seniority is good; better for service if men were only promoted by seniority, unless in cases of special or war services; merit being admitted in an exceptional case. 5149-5154.

Engine-Room Artificers.—In "Agin-court" there are two fitters and a boilermaker, they keep watch in stokehold; in "Rattlesnake" one was allowed, but during commission there were three, trades, fitters and turners. 5040-5045. Stoker mechanic does blacksmith's work in "Agin-court," boilermaker his own smith's work. 5046. If pay were slightly raised and made progressive, and better pensions allowed, men could be obtained from outside as well as from dockyards; now principally come from factories, but practical experience is gained outside. 5080-5081. Would give on entry 5s. a-day, after 10 years 7s. 6d. a-day; pension 3d. a-day for each year served; more pay a greater inducement to enter, but think of pension, and it is decidedly an inducement for men to remain in service. 5082-5085. Complain of having to do menial work, cleaning mess out and scrubbing hammocks; they would prefer being more under control of chief engineer instead of master-at-arms; suggests they be made senior to all chief petty officers; if placed under engineer department leave might be given by chief engineer; should have separate mess and servant; having to do menial work prevents good men coming into service, and if they do enter it makes them discontented. 5086-5088. In "Agin-court" mess on lower deck forward, the mess deck; mess with schoolmaster and other executive chief petty officers; master-at-arms and ship's corporals mess with chief quartermaster and chief captain of forecastle. 5089-5093. Not aware they have a boy to attend on them, if they had a serious cause of complaint would be removed; has set stoker sometimes to clean mess for them. 5094-5095. Leave in "Agin-court" under control of chief engineer, after they have his permission they go to master-at-arms. 5096-5097. Complain about chest, would like original size 3ft. 4in. by 2ft.; complaint reasonable, require more room than other chief petty officers, having more clothes. 5098-5100. Those in contact with, six, good workmen with one exception, a fitter. 5101-5102. Only once in "Agin-court," a boilermaker worked on board other ships of squadron; he was paid usual check pay. 5103-5106. Artificer in flagship on coast of Africa occasionally required to work on board other ships, but could not have spared in "Rattlesnake"; were short of engineers, and artificer had to keep watch in engine-room. 5107-5109. In "Agin-court" not on watch in engine-room, there being sufficient engineers; they hold certificates from chief engineer they previously served with, qualifying them to take charge of engines. 5110-5112. Does not think making senior to all chief petty officers would be considered unfair and cause jealousy; engine-room artificer belongs to distinct race, entered service as a skilled artisan, others did not; object in making senior that they may be independent of master-at-arms. 5128-5129. Does not consider complaint against master-at-arms is one against discipline of service; engine-room artificers are so distinct, they ought to come more under chief engineer, and it would be better as far as possible to do away with all relative rank, making them more exclusive, and removing them from lower deck. 5130-5131. Engine-room artificer in "Rattlesnake" at the Cape received check pay about 15 or 16 days a-month, but it was quite exceptional, probably more than equivalent to overtime in private employ, but perhaps it would never occur again; has only seen on extra pay once besides in Channel Squadron, and a few days in squadron at Gibraltar. 5132-5133, 5147-5148. No clashing in "Rattlesnake" with master-at-arms about cleaning mess, artificer so much on shore, a stoker assisted in cleaning. 5134.

In General.—Seniority 1862; is serving in "Agin-court," her complement is seven engineers and three

engine-room artificers. 5034-5039. A satisfactory complement for "Agin-court" would be one chief engineer, four engineers and six or seven artificers. 5062-5063. Served time as an engineer boy at Woolwich, was there five years. 5120-5122.

CAPTAIN GEORGE H. PARKIN, R.N.

Engineer Students.—Fancies are entered from many classes; has known sons of naval officers and engineers enter; not aware there was no limit to social position of parents, nor that students were the sons of dockyard labourers, privates in the marines, &c., that being the case thinks present system is not good. 5215-5219. Is very much against open competition, is certain it does not insure getting the best men. 5244-5245.

Engineer Officers.—Would not say young engineers are more efficient in charge of stokehold in case of emergency than an engine-room artificer, but thinks stokehold is excellent training; does not see how engineer can be competent without going through duties in. 5168. Theoretically engineers have to take charge of engines as soon as appointed to a ship, but doubts it practically; experience is they are put to other duties to gradually accustom them to take charge; does not refer to ships having two or three engineers only; in "Falcon" young engineers took charge of stokehold. 5169-5170. Bringing up young engineers in small ship very good training, but there must be some in a large ship, and knowledge of large stokehold is important; only one assistant in "Triumph," it may be rare to have more in large ships, but had more in "Victor Emanuel" and "Crocodile." 5171-5173. Enough engineers in "Crocodile" to put into three watches; considers troopship a most excellent school for young engineers and all connected with engine-room. 5174-5175. Aware rate of promotion to chief engineer is very slow, a man should be promoted to that rank nearer 30 than 40; present age for promotion is 43, and increasing, is not a desirable system to keep up. 5176-5179. Suggests to expedite promotion that seniors whom it would not be desirable to have as chief engineers, should have retirement that would compensate them for loss of promotion; chief engineers promoted at an advanced age not being able to make up time before retirement acts prejudicially to the service. 5180-5182. Number of engineers not being reduced, junior list should be kept fuller in proportion to senior, and as all on junior list could not be promoted, would give opportunity of fair retirement. 5183. Would make promotion to chief more by selection; not prepared to recommend any proportion for seniority and selection. 5184-5185. Has found no disinclination on part of engineers to do manual work, as young men work well. 5186-5187. Engineer best as a fitter, engine-room artificer as a boilermaker; engineer better as fitter, education giving greater advantage to a mechanic's work. 5188-5189. Would not reduce amount of education; has not considered question of pay. 5190-5191. Present proportion of engineers being maintained, slow rate of promotion must also be, but a large number of engineers would retire if inducements were held out; desirable to hold out inducement to quicken promotion. 5193-5195. Not witnessed repugnance on part of engineers, with high education, at working with engine-room artificers, it must be done, therefore it cannot be changed; should be sorry to see artificers entered instead of engineers, and if position of latter were raised with a view of taking manual work away from them, should be against it. 5196-5199. Questions work being done better for 5s. or 6s. a-day; thinks it a great advantage engineers should be at manual labour, sorry to see time when young engineers had not to perform. 5200. Keeping at fitting and filing, notwithstanding other important work they have to do, makes much more valuable, but they only occasionally have that work; boilermaker artificers better than engineers in their particular branch, but as fitters many engineers are quite equal to engine-room artificers. 5201-5203. Cannot say whether general impression amongst engineers is that they would like to be replaced by engine-room artificers, everyone desires to get off manual labour as soon as they can. 5234-5205. Would not like to see engineers, until they had attained greater rank, bear same relation to engine-room artificers that executive officers bear to executive chief petty officers, as they learn profession more thoroughly by doing every part of it in their younger days. 5206-5207. Limit of age is a point which is practically worked out on board ship; senior engineer in "Triumph" does duty in his department that senior executive does over whole ship; he keeps four to eight watch, manual

labour being done by junior engineers. 5208-5211. Recommends pay should increase in accordance with standing and service; would not introduce into ward and gun messes, are more comfortable where they are. 5212-5214, 5219-5220. Had 40 stokers in "Crocodile," proportion of nine officers to 40 stokers is large, but wishes to maintain, not considering officers are so much over men as in charge of one of the most important parts of the ship. 5221-5223. If man of lower pay could be found to take charge of engines, does not think it would be advantageous to substitute him for young engineers; there are critical moments when you want men of a certain social position to do the work; one great way of improving social position is by giving good education. 5224-5225. Has not seen so much manual work as is described, there is only heavy work at times; of opinion engineers should do casual repairs to their own engines, by that means they will become acquainted with the anatomy of an engine. 5226. During last 10 or 12 years engineers have been reduced and engine-room artificers substituted; it has been a good thing, but would not go further. 5227. Suggested old chiefs should be retired; would only be temporary relief, but list can be reduced. 5238-5239. Has taken several cruises in P. and O. steamers, chief engineer of ship he came home in a highly intelligent man, but not superior to engineers in navy; it is only the really intelligent men who rise to top of list in merchant service. 5240-5242. By keeping up relative number of juniors to chiefs at 4½ to one, and offering inducements to seniors to retire, promotion will be spasmodic at first, but anticipates a good flow of in a few years. 5243. Not prepared to propose rate of pay at any fixed age; should go by service; increase to be progressive, an engineer not promoted after 12 or 14 years' service, would then have a certain compensation by increase of pay. 5246-5249. Has not heard there is a feeling that engineers as commissioned officers should not do manual work, has not seen senior do, believes has been confined to juniors; does not think it tends to lower them in the opinion of other officers in the ship. 5258-5259. With present proportions of seniors to juniors a good flow of promotion has not yet been attained; thinks are going the right way to work in own branch of service, and in a few years there will be a steady flow, and it will apply to other branches; a great many officers can never expect promotion, but they could have almost an equivalent in good retirement. 5260-5262. Better chance of getting very best chief engineers by keeping large stock of juniors to make selection from; to a certain extent would change promotion by seniority. 5262-5263. If good retirement were offered Admiralty should put veto on men going they wished to keep. 5264-5265. Cannot judge what proportions should be by comparing with another rank, duties so different; ought to have increase of pay, and it should be progressive if not promoted. 5266-5267. Would like to see engineers do their own repairs as far as they can; would not go back to system of ten years ago, and dispense with engine-room artificers, they are good men for repair of the boilers; engineer should go into but not remain in the boilers like the men who repair. 5268-5269. Would not recommend two chief engineers should be appointed to "Triumph," system of having next man to the chief engineer an engineer is a very good one. 5275.

Engine-Room Artificers.—Has had experience of in "Triumph," "Victor Emmanuel," and "Crocodile"; has found most efficient; are generally blacksmiths and fitters; present proportion appears to be very good if junior engineers work in the same way. 5158-5160, 5165-5166. Should include amongst fitters, boilermakers, as they are most necessary, "Victor Emmanuel" could not have made passage to China in way she did had it not been for their efficiency. 5161-5164. No advantage in altering proportion of and of engineers in a ship; much against putting engine-room artificer in charge of stokehold. 5167. Has not considered question of pay. 5192. In "Crocodile" when not actually employed in looking after certain parts of engines were effecting repairs; one had charge of one watch in stokehold as there were not enough engineers. 5228. Had separate mess under top-gallant fore-castle; arrangement satisfactory, and there was no difficulty. 5229-5231. Messed in "Triumph" with chief petty officers, but now have an enclosed space, and are much more comfortable; obtain leave through master-at-arms, but as long as they behave themselves there is no further trouble. 5232-5233. Muster for inspection with petty officers; at divisions stand out to centre of deck while men are at the side. 5234-5236. Cannot speak positively, but thinks since in command one has re-entered after 10 years' service. 5237. Thinks complaint with regard to master-at-arms is ideal; as regards messing in

ships commanded by, comfort has been studied; always had someone to clean mess, a good thing; all chief petty officers ought to have messes cleaned for them; no doubt about want of pay, look to what men in own position get on shore; chief petty officers get small pay in comparison to artificers as workmen, it is a question of supply and demand; cannot see how could claim large pension, receive high pay during service, and own class would get none on shore; uniform a very good one. 5250-5254. Would not make senior to all other chief petty officers. 5255. As a rule should not take charge of stokehold, as an engineer should; natural they should in small ships, there not being sufficient engineers. 5256-5257. Enumerates clothes which may be considered to be a fair kit for an engine-room artificer; does not consider present chest, 3ft. by 1½ft., stows conveniently. 5275.

In General.—Now commands "Triumph" has not been to sea in her; previously commanded "Victor Emmanuel," "Crocodile," and "Falcon." 5155-5157. Had in "Crocodile" one chief, eight engineers or assistants, and three engine-room artificers; does not think staff in "Triumph" sufficient, would have besides chief engineer, a senior engineer to do nothing but a first lieutenant's duty, keeping four to eight, or four to six watch, another to attend to valves, water-tight spaces, &c., &c., three junior engineers to keep watch in engine-room, and three assistants to keep watch in stokehold, an increase of three; would not increase engine-room artificers. 5270-5274.

JOHN HENRY MACEY, FITTER, H.M. DOCKYARD, DEVONPORT.

Is now working in dockyard, belongs to factory; is a millwright and fitter; about seven years ago was in service as artificer. 5276-5280. Was about eighteen months in service, before that worked in private trade in London, and in factory at Keyham for about five years. 5281-5285. Served time at Torr Point as millwright; directly out of time, went to London, received 30s. a-week as a fitter at Messrs. Humphrys and Tennants', marine engine makers, from there went to dockyard factory. 5286-5292. Had in factory 5s. a-day for six days in week; earned overtime there and at Messrs. Humphrys and Tennants'. 5293-5296. Did not work much overtime at Messrs. Humphrys and Tennants', was paid so much per job; worked fifty-four hours before overtime counted; was checked if did not come to time in morning, 2d. for quarter of an hour, according to wages, lost half-day if more than a quarter of an hour late. 5297-5301. If absent two days would have been discharged; belongs now and did then to trade's union; pays 1s. a-week. 5302-5306. Receives from trade's union 10s. a-week if sick, hurt, or out of work; if hurt in dockyard gets half-pay and 10s. besides. 5307-5309. Is married; widow at death gets £7 from union; if wife died would get £5; if disabled would get £100 down; if could not work after 20 years would get pension of 9s. a-week. 5310-5312. Belongs to amalgamated society of engineers; does not know what 1s. a-week in Insurance office would give widow, does not belong to branch of that sort; if did not pay 1s. a-week to the trade union should not get a job so easily; Navy gives artificer every advantage except giving widow something at death. 5314-5315. Is not aware that 1s. a-week paid to Insurance office from 25 years of age would give widow £120; it is worth considering. 5316-5317. Entered navy as artificer June, 1869; went to "Calliope" floating factory as a fitter, remained 2 months, was then drafted to "Northumberland," was 15 months in her; applied for discharge, got it without purchase, was only acting, not confirmed. 5318-5326. Bore good character while afloat, left because did not like service, did not like cleaning mess and scrubbing hammocks; master-at-arms had great deal to do with him, prevented him going on shore till eight o'clock, though work was often finished at half-past three. 5327-5332. Only went on shore in regular watch, two nights ashore and one on board; wanted to go ashore when finished work without waiting for other men. 5333-5334. Not a question of pay with him, but one of treatment and comfort on board; there was no position; has had to take own hammocks on deck for muster; messed with chief petty officers, chief captain of fore-castle and chief boatswain's mate; master-at-arms generally has place to himself. 5335-5336. Receives 30s. a-week when came back to factory; gets 6s. 2d. a-day, 37s. a-week now. 5338-5341. Chief complaints those already mentioned, thinks no artificer liked scrubbing out the mess; would himself rather work ashore at trade or in engine-room; Saturday was the general day for cleaning mess. 5339-

5345. Stokers clean out engine-room; had charge of stokehold at sea; never received certificate of being capable to take charge of engine, never asked for one. 5346-5349. Liked life on "Calliope"; had seven days' pay and prospect of pension, but did not care for service when he saw what it was; age 25 when went to sea; took fancy to go from seeing others do so, chief inducement the pension; not aware should have had £1 a-week after twenty years' service. 5350-5357. No fault to find with chest, only in small ships it is not large enough. 5358. Has plugged boiler tubes; boiler maker shifted them, helped him sometimes; never learned smith's work; could make patterns for castings in wood. 5359-5364. Did not like the short jacket, uniform should be single-breasted frock coat; would wear working suit on purpose for engine-room. 5365-5367. Pay should increase according to service, maximum should be 9s. a-day after nine years' service; they now enter at 5s. for seven days a-week. 5368-5371. On shore you are paid for extra hours; knows men who get 7s. 6d. a-day on shore; engine-room artificer should have 9s. a-day, because of inconvenience of going to sea. 5372-5374. Should have more pay for going to sea than at home, prospect of pension not sufficient inducement; £52 a-year after twenty years' service is a good pension. 5372-5377. No other complaint as to treatment on board; master-at-arms with exception question of leave did not worry unnecessarily, treated him exactly as any other chief petty officer. 5378-5380.

ROBERT NICOLL, ESQ., R.N., FIRST ASSISTANT TO THE CHIEF ENGINEER, H.M. DOCKYARD, DEVONPORT.

Engineer Students.—Are not such good workmen after six years' training as trade boys, because latter are kept to work, there being no stoppages in their case to attend school, &c.; a trade boy is confined to his branch of trade, the student has a knowledge of boilermaking, copper-smithing, and smithing, but it is superficial. 5417-5418, 5421-5426. Ought to commence with pattern-making; would give three years in pattern shop, there they learn to understand drawings, moulding, and obtain knowledge of shrinkage of metals, and would be learning whole business except fitting and filing, which could be picked up in six months. 5427-5429, 5437. Thinks they get enough instruction in drawing, but would apportion time differently. 5438-5439. Assists in examining for entry as engineer officers when Mr. Trickett is absent. 5440. Not more trouble with than is natural with so many youths; get so many marks for theoretical education, are often found stowed with mathematical books in their hands. 5443-5445. Dockyard officers have the power of preventing their getting certificate of qualification for practical work, but it hardly rests with them to determine whether they are practical workmen or not, they have not time to pick up practical knowledge; would give two years in factory, after they had finished at college, to gain experience in taking to pieces, examining, and putting engines together again, and about all fittings pertaining to their department. 5446-5448. Would give them longer time in factory and amongst ships to obtain knowledge of marine steam-engine; important to a naval engineer to have thorough knowledge of parts of and mode of repairing engine, not only to be able to do work, but to superintend also. 5449-5453. When machinery of ships was in erecting shop would have in; might be put on repairs of machinery of ships in the shops; if had charge of a vessel to re-fit would give a knowledge of what was required in engine-room; might be attached for instruction to a leading man. 5454-5455. Good naval engineer would not be better able to instruct than leading man; could gain knowledge of engines by reading, scientific knowledge at college, and working of engines during trial trips. 5456-5457. Does not see any means of improving life of students; while in factory are treated in same way as other men, could not make any change unless they are made a distinct class. 5460-5465. Position is open to the world, subject to open competition; results are probably not satisfactory, the students being sons of privates in the marines and dockyard labourers, but if anything else were done it would be looked on as a retrograde movement. 5466-5469. Might be obtained from higher social position if appointments were made by nomination, service would benefit in one way, but not altogether. 5470-5473. In a mess no doubt gentleman's son as an engineer would be more tolerated, and everything else being equal would be a better officer and more efficient engineer than the son of a dockyard labourer, but it would be a retrograde movement to go from principle laid down. 5474-5475. Suggests to improve class that no pay be given; gentlemen have to pay high premiums for sons to be trained as mechanical engineers, and they do not get half the attention students

receive; if engineers were treated as *bond fide* officers gentlemen would covet position for their sons. 5476-5479. Best way to train would be to place two or three under best workmen, who should receive remuneration according to degree of perfection they attained in practical work. 5493-5494. Class from which they spring not quite satisfactory, but an alteration would be looked on as a retrograde movement; present system gets cleverest boys, but perhaps not those with best physique. 5495-5497. If were drawn from higher social class, an equally good proportion of candidates would present themselves. 5497-5498. Does not consider doing manual labour lowers a man in anybody's estimation, a good workman, whether he be a gentleman or not, does not suffer in that respect. 5499-5500. Would give three years at pattern-making, fit then to do anything; should come back to factory for two years, after they have been at college, to gain experience, would not recognise as engineers until then; ought to be under training from about 15 to 23, would then be fit to take charge of a watch and to be chief engineers. 5519-5524. Are instructed in iron ship-building, work amongst shipwrights and people building the ships. 5533-5538. Useful and practicable for some one qualified to give them a lecture on marine steam-engine; time ought not to be taken out of fitting shop, lose interest in work if taken from it, and it is the principal cause of their being indifferent workmen. 5539-5541. Not a good system to send alternately to school for a week or fortnight, and to work for three weeks; thinks, considering the college as well, schooling in the evenings would be sufficient for theoretical education. 5542-5545. If did not get pay then position of engineer in navy would be coveted by gentlemen's sons, if at all, especially if engineers were recognized as *bond fide* officers. 5545.

Engineer Officers.—Could do away with as many juniors as you introduce engine-room artificers; in ship like "Sultan" there should be five engineers, and the rest of the complement engine-room artificers. 5413-5414. Has not seen any young engineers at work after serving their time. 5415-5416. In event of reducing in the proportion as proposed for "Sultan," it would enable us to have small body of highly-educated engineers, who would not be required to do so much manual labour, but then something would have to be done to keep them in service. 5441-5442. Pay of generally is far from satisfactory; not prepared to suggest improvement, but fancies old engineers who have no chance of promotion ought to get remuneration. 5480-5481. If numbers were reduced promotion would be very little quicker; not prepared to say what pay an engineer should get after ten years' service. 5482-5483. Has seen "Case of Naval Engineers"; pay in it very liberal. 5484-5485. Is on full-pay as chief inspector of machinery, has allowance of £30 added; pay is £350, after nearly 33 years' service, does not think it satisfactory. 5486-5491. Considers an engineer who has once mastered practical part of profession ought to be always able to supervise manual work of those under him. 5492. Promotion would not be much accelerated by the substitution of a good proportion of engine-room artificers, might be by appointing chief engineers to smaller vessels. 5501-5502. Would not lower age of chief engineers for retirement, it would accelerate promotion, but men would be lost at their best; must always have a large reserve; engineers he had during Crimean War were not worth their salt. 5503-5504. Considers in justice to service an engineer ought to be promoted to chief at 32 or 33. 5505. Thinks many senior engineers if offered fair retirement would go—they are so discontented. 5506-5507. Would certainly not again recommend introduction of temporary service engineers in same way as during Crimean War; in event of having to commission more ships, sees no other way of filling up complements except by keeping up large reserve of engineers, giving them increase of pay after certain service. 5512-5515. Would abolish rank of assistant, having only engineers and chief engineers. 5525. Vessels having engines indicating 600 horse-power should have chief engineers. 5526-5528. If engineers were allowed to retire at earlier age on condition of serving in time of war, it must be stipulated when they go on reserve list; cannot say whether they would take retirement under the circumstances, thinks some would. 5529-5530. Thinks when they join service (according to views he has on their training, &c.) should go into ward-room; after giving education of gentlemen and expensive training, should be treated properly as regards pay, comfort, and position, to keep services. 5531. Was in ward-room himself from 1847 until he left navy; does not think that son of private in the marines, dockyard labourer, or washerwoman, who is in fitting-shop six years is prepared to join ward-room mess. 5532-5533.

Engine-Room Artificers.—No experience of afloat; examines for entry; opinion of qualifications generally very good; if qualified, good to have in service. 5385-5388. Fifty or sixty have entered from factory—some of the very best workmen; larger proportion of fitters than boiler-makers have entered, no smiths, and only one copper-smith. 5391-5392. Smiths and fitters from outside have been examined, but could not say whether the latter were armourers; were good men, judging from answers. 5393-5395. List of candidates not kept in factory; cashier of factory keeps list of factory men; when factory man applies for entry his name is sent to steam reserve office with a certificate, he is examined according to rules laid down; examines himself when chief engineer (whose special duty it is) is not there; does not see work again, unless they come back to factory. 5396-5404. Men, but not good men, can be obtained for present pay; does not think good men would come for increase of 6d. a-day at entry, and increase to 7s. 6d. after ten years' service; are good and experienced after ten years, and would go into merchant service as engineers; suggests 9s. or 10s. a-day at end of ten years. 5405-5410. Boiler-makers might remain to complete twenty years with prospect of the pension for less than 9s. a-day, but a fitter is a high-priced man, who could take charge of a watch immediately. 5411-5412. A good thing to get trade boys to enter, but they ought to have experience before coming in, are out of their time at 20 to 21 years of age. 5419-5420. Would do to form a reserve, men being those on whom you could depend; could be employed profitably in factory, sees no objection; arrangement might be made to prevent clashing between naval and civil element. 5516-5518. No fitters in dockyard receiving 9s. a-day; some leading men are, but they would not take the position of engine-room artificer. 5534-5535.

In General.—Is first assistant to chief engineer at Keyham, has held position nearly ten years; "Renown" was last ship in which he was chief engineer. 5381-5384. Served his time (six years) in Dundee; the trade was making marine and land engines, and spinning machinery; was three years at pattern-making, rest of time in drawing office, fitting and erecting engines and running steamers made. 5430-5433. Joined service in 1843 as second engineer, and was immediately placed in charge of machinery; took the "Gleaner" to West Indies, and brought home the "Carron." 5434-5435. There is one other assistant to the chief engineer besides himself. 5458-5459.

MR. AARON H. SYMES, ENGINEER, R.N.

Engineer Students.—Thinks should be nominated and selected by competition; position should not be thrown open to public competition. 5606-5607.

Engineer Officers.—Never expects promotion to rank of chief engineer, is 38 years of age; if offered promotion at once, or retirement, thinks would retire, and that a large number of his brother-officers would do so also. 5557-5561. Would try for some other employment if retired; knows of nothing particular, but case as far as promotion is concerned is hopeless; has not passed. 5562-5563. Promotion is too slow, to improve would increase number of chief engineers by about thirty, and employ them in smaller ships. 5564-5567. Considers larger retirement should be allowed; engineers to have progressive pay as an inducement to serve on, can never get more than 10s. a-day now. 5568. If all engineers over 40 were offered good retirement it would not bring him to top of list for seven years; if number of chief engineers were increased it would bring up earlier, but is two hundred and ten from top now. 5569-5570. A man should be made a chief not later than 35; did not qualify, having served abroad nearly all first twelve years of service, and then seeing position gave up hope of promotion, and never studied; only thing to look forward to is to retire at 45; will then have as now 10s. a-day and 1s. a-day charge money if in charge. 5571-5576. If number were reduced would fill up vacancies in ships with engine-room artificers. 5577. Should consider before retiring, if retired on condition of serving again in case of war, as he should not be able get employment; would depend on amount of retirement whether men would go on a reserve list with higher retirement, and be liable to serve in an emergency, or be retired altogether on a lower retirement. 5591-5592. Thinks young engineers who now join are too well educated, and that their practical training might be improved. 5593-5594. Present education is not too high if they do not do manual work; an officer ought not to

take off his coat to do manual work, but should have a knowledge of it to be able to direct others and assist in case of emergency. 5595-5597. Would give on entry 7s. or 7s. 6d. a-day, to progress after three years up to 13s. or 14s. as engineers; pay of chief engineers should be increased accordingly, and a senior engineer ought to be on about same footing as a chief. 5598-5602. Money would be a greater inducement to retire than a step in rank. 5603. Engineers' mess should be abolished, but does not see how it could be done at once; considers education of engineer officers entering ought to admit to any society, knows at same time there are drawbacks to their introduction into gun or ward-room messes. 5604-5605.

Engine-Room Artificers.—Shipmate with in "Defence," had in her a boiler-maker and a fitter; satisfied with them, they were very useful, and always willing to work. 5578-5582. Suggests messing accommodation be improved, and they should have small progressive pay; 5s. 6d. a-day to commence with, and rise to 7s. 6d. 5583-5585. Are annoyed by interference of master-at-arms, and it has been a drawback to the entry of many; does not know as many as are wanted can be obtained; should get better class if pay were raised a little, and disadvantages were done away with. 5586-5588. No objection to uniform, but they do not care about jacket. 5589-5590. Of same rank as master-at-arms, and as skilled mechanics, do not care to be ordered about by him, has heard many complaints about it, and seen it; having no servant to clean mess out an objection. 5608-5610.

In General.—Is an engineer of 1867; has been nearly sixteen years in service. 5546-5548. Was three years engineer in charge of "Vivid"; is now doing duty in "Valiant" for the chief engineer, who is sick; does not get charge money. 5549-5552. Entered service in February, 1860; before that served time (five years) at Messrs. Maudslay, Sons and Field. 5553-5556.

JAMES BORLASE, ENGINE-ROOM ARTIFICER.

Now serving in "Iron Duke"; last ship "Vanguard"; has been over five years in service. 5611-5614. Before entry was employed by Messrs. Revell and Hudson; joined factory as fitter after putting engines into "Audacious." 5615-5617. Remained in factory about a week; was 23 on joining service. 5615-5619. Had 36s. a-week when with Messrs. Revell and Hudson; employed for several years as hired man; put in engines of "Seagull"; worked on "Daphne"; both men-of-war. 5619-5622. Age 21 when out of time; served six years as apprentice, paid £20 premium; received 1s. a-week for first two years, then 2s., then 3s., and for last year of time about 6s. a-week. 5624-5626. When put on work had 22s. a-week; rose to 36s. a-week, but worked for different private firms; preferred service to factory, because thought would like sea-faring life; is now married, but was then single. 5627-5631. Engine-room artificers being required, was recommended and entered, after two months in "Calliope" went to sea in "Pigeon" gunboat; was away about 4½ years, during which time was sent from Gibraltar in gunboat "Pheasant." 5631-5634. "Pigeon" had two engineers; kept watch himself the whole time in engine-room; at first only one engineer in "Pheasant," and had to keep watch and watch with him for some time; another engineer was lent to bring vessel to Portsmouth. 5634-5637. In "Vanguard" was officer of watch in stokehold; there were three watches; never had charge of engines; it required two engineers to work engines quickly. 5638-5642. Called himself an engine fitter; can do a little at the forge, also boilermaker's work. 5643-5644. Likes service very well; would like not to come under jurisdiction of master-at-arms, and to have proper mess accommodation; in "Pigeon," because unable to clean mess every morning, was reported by chief gunner's mate, and had to leave mess and mess with stokers. 5646. Better to have messed alone in "Pigeon"; could have paid cook extra to do everything; pays man 8s. a-month to clean hammock and wash extra clothes; paid 5s. a-month for hammock in "Vanguard," could not get it done for 4s. 5647-5648. Messed forward in "Vanguard" close to galley, with writer and schoolmaster right before marines; every thing stolen in "Iron Duke," as no one was excused to look after mess; one boy employed to scrub mess, if not one of the writers and himself scrubbed it; on entry expected to be subject to discipline, but not to scrub mess, did make inquiries and understood two boys were allowed for five chief petty officers. 5649-5654, 5658. One boy enough to clean mess, if excused; boys in "Van-

guard" had watch below at sea, but not in port; same master-at-arms and officers in "Iron Duke" as in "Vanguard"; when hands are on deck, mess is cleaned by one of the petty officers; all the petty officers are messes together. 5655-5663. Own mess cleaned by one of the writers or himself; when he joined did not expect a servant, but understood that a boy was allowed to clean mess. 5664-5669. When on shore, home kept clean by people he lodged with. 5670-5671. In "Vanguard" went for leave to chief engineer, then to master-at-arms, signed name on slate at gangway as well; commander will only receive applications through master-at-arms. 5672. Have now in mess seven chief petty officers and two boys; there are three artificers. 5673-5674. Would rather mess by themselves apart from sailors and marines, who caused annoyance by pitching potatoes and bread into mess and making unpleasant remarks; chief petty officers complain of engine-room artificers because they refuse to scrub mess and cook dinner. 5675-5680. Does not know that petty officers complain of engine-room artificers, because they refuse to scrub mess and cook dinner. 5675-5680. Does not know that petty officers complain of companionship of engine-room artificers, only of a certain class who are dirty. 5681-5682. Petty officers not good company, if you want to become a blackguard then you can mix with them. 5683-5685. Applied to purchase his discharge in "Pigeon," told to wait; had not money ready, but could have sent for it; does not purchase at present as he is very comfortable, and waiting to see if there will be a change; annoyance by sailors and marines not sufficient to prevent his remaining in service; not disturbed at present. 5686-5690. Would benefit class if amount allowed for clothes lost were considered; £10 allowed for clothes, bed, and blankets lost in "Vanguard"; his own clothes were worth about £24; Admiralty cannot be expected to pay for everything, but nothing is given in comparison to what is lost; would pay £10 for his chest, as it had indentures and everything in it. 5690-5699. One of the other artificers a boilermaker, the other a fitter; smith's work done by stoker mechanic or by himself; has no help from ship's blacksmith. 5700-5703. Points for improvement of condition are, better uniform and messes, little more pay, and to be free from master-at-arms; made even to take buttons off jacket to make uniform distinct from that of master-at-arms, Admiralty Circular says their uniform was to be the same; had worn the buttons four years, and Lord Gilford three years before at Portsmouth said they were to be retained. 5704-5708. Is now receiving 5s. 9d. a-day; thinks should receive 9s. a-day after ten years, to find extra provisions, and to make up for being away from home; if in merchant service might after passing Board of Trade become 1st or 2nd engineer. 5709-5711. At present comfortable, and will try and rub on till end of ten years; if service is not different then will not rejoin; pension no greater to look forward to than that of petty officer, a penny a-day for every year's service. 5712-5714. Thinks any petty officer can get £1 a-week pension, and chance of getting that pension, after 20 years' service depends on officer who writes for it; did not know that an officer, if character were good, could not influence pension. 5715-5718. Has advantage over other petty officers in joining as chief petty officer, but they are trained at the expense of the country after they come into service, whereas he was trained at his own expense, and would have been discharged had he been found not competent. 5719-5726. Could in private factory get 6s. a-day at first, and on becoming a standing man 9s. by taking job and paying other men, but could not be sure of permanent employment and pension. 5727-5729. In service when sick, kept six weeks in hospital with full pay; in private trade supported by clubs, which they pay for. 5730-5733. In private firms paid for six days in week, at sea for seven days; provisions given in navy, but not in private firms. 5734-5737. Expects about £50 pension, but would like more on account of risk of being disabled; cut his hand to pieces in "Vanguard," doctor refused certificate, no bone being broken; hurt caused by trying to start ash engine with senior engineer. 5738-5743. Would have got £1 a-week from the "Hearts of Oak" in London for it; any one in navy who does not go aloft can remain in club; asked doctor for smart ticket, but could not have one without permanent disablement. 5741-5747. Would like frock coat for uniform, similar to assistant engineer's or school-master's; should wear canvas or duck suit in engine-room. 5749-5750. Does not know French, but thinks with three months' schooling could pass for engineer, and say what an elastic particle was. 5751-5752, 5756-5759. If men were allowed to enter from outside would be glad to go up for engineer; knows decimal fractions, but not thoroughly, has had no time to work them up; has had no

schooling since a boy. 5753-5755. 9s. a-day and frock coat would put in position of an engineer, but assistant engineer has chance of getting on. 5760. Would rather leave service after 20 years than remain all his life; engineers can go on half-pay, and he has not that advantage. 5761-5762. Hands in statement embodying views of about 200 artificers; chief points, alteration of mess arrangements and larger chest. 5762-5766. Wish to be removed from chief petty officers, do not wish to be above them; but to be out of jurisdiction of master-at-arms, not to have anything to do with lower deck, and to be as much as possible under control of chief engineer; are now spoken to as ordinary seamen. 5767-5772. Has not known what to do, being ordered by lieutenant to scrub lower deck, and told by engineer not to do so but to do work of engine-room. 5773. Has received 3s. a-day extra for working on other ships; was good addition to pay, but there was extra money for washing, on going to another ship to work must have duck suit, and pay for it being washed. 5774-5779.

MR. JAMES MELROSE, ENGINEER, R.N.

Engineer Students.—Fairly aware of practical training, is about the same engineer boys received. 5794-5796. Has not been thrown much in contact with. 5806. Thinks, after considering class they come from, and their being educated at Government expense, they could expect to receive more than 6s. a-day on entry as engineers, could demand more in world as surveyors, draughtsmen, overseers, &c. 5805-5807. Weekly wages the great inducement for entry, are far more than a reward for services at the time; to ensure enlistment of a superior class of youths would not give any pay. 5808-5870. Superior class could be obtained by nomination by Admiralty, a better plan to combine with material reduction of pay. 5871. Under impression they have learned work before going to sea, that is as far as scientific acquirements and practical knowledge are concerned; scientific knowledge is of use at any time. 5872-5874. Are of use during first two years at sea as engineer officers; on first going to sea would put to controlling and directing duties in engine-room; keeping watch in stokehold could be as well performed by an ordinary skilled mechanic. 5875-5878.

Engineer Officers.—When he entered service average time before becoming a chief engineer was 10½ years, and he naturally expected to get promotion in that time; average time is now 19 years, and if things remain as they are, has no expectation of being a chief engineer. 5816-5818. Suggests, to quicken promotion, to materially reduce list of engineers, and substitute engine-room artificers. 5819. Would reduce list by offering adequate retirement to engineers over age of 35, after that age men not being qualified for the rank of chief engineer. 5820-5821. To be an efficient engineer of an ironclad a man must necessarily possess unimpaired activity and use of all senses; would not think qualified over 40 if had been 20 years in the service. 5822-5824. Thinks chief engineer, as he would have more comforts in that rank than in that of engineer, might be capable to carry out duties up to, but not over the age of 50; considers majority of engineers senior to him are not men of unimpaired activity, and in perfect possession of all their senses; duties of a young chief engineer in an ironclad are so manifold he needs to be almost ubiquitous, at any rate on promotion he should be very active and a man of unusually good qualities, both physically and mentally. 5825-5827. Would not like to see promotion by selection altogether originated. 5828. Men will never possess necessary qualifications on promotion as list is now, but if they reached the top before 35 they might be expected to have the necessary requirements. 5829-5830. Would offer retirement, but not before age of 35, to men who though not unfit physically might not have all the necessary capabilities. 5831-5833. Does not think promotion by selection advisable, difficult to get at best and most deserving men; influence would probably be exerted, and in many instances most meritorious have no opportunity of displaying qualifications. 5834-5836. Suggests a retirement for engineers over thirty-five years of age, 6d. a-day for each year's active service; would not make retirement compulsory at thirty-five; if pay were higher than retirement some but not many would remain; thinks quite 200 over thirty-five years of age would be willing to go. 5837-5843. Proportion of engineers to senior ranks to give good promotion should be not more than double; present proportion 800 to 172. 5844-5845. To improve promotion chief engineers should be retired at fifty instead of fifty-five, and the list increased by employing them in

ships with engines of 650 indicated horse-power. 5846-5847, 5850. Not necessary for a chief engineer appointed to a small ship to keep watch in engine-room if given three engine-room artificers. 5848-5849. Has been to sea with two chief engineers; not a good plan; did not work in "Warrior"; quite likely same jealousy might exist if ranks were assimilated although titles were different. 5851-5855. Thinks pay should be improved by making it progressive up to a maximum for an engineer of 14s. a-day after 14 or 15 years. 5857-5860. If rate of promotion to chief were the same as at time he joined it, would be quite as much benefit as progressive rise of pay, and besides there would be benefit of cabin and ward-room mess earlier and higher rate of pension for widows. 5861-5862. Pay on entry might be increased to 7s. 6d. a-day; thinks are worth more if market value be put on qualifications and abilities; at any rate entitled to higher remuneration than 6s., having in view could obtain higher pay in outside world on completion of studentship. 5863-5864, 5879. Young engineers unfortunately do marry early, it is bad for the service; does not think there would be greater tendency to marry if pay were increased; during studentship if were placed under control and had not same pay it would act as a preventive; would advocate reduction of pay on entry if he thought increase would encourage marriage. 5881-5885. Does not consider duties of an engineer should be confined to engine driving, they should be the controlling and directions of the manifold operations in a man-of-war. 5891-5895. Duties of an engineer in ship like "Swiftsure" would be assisting chief engineer in controlling men under his charge, and carrying out work for the preservation of the machinery. 5896-5899. Recognises importance of keeping a watch in engine-room, but it might be as well kept by an engine-room artificer, at same time would always have an engineer supervising work in watch-keeping and all other operations. 5900-5901. Should like to see engineers' mess abolished and engineers made members of ward-room after five years' service, but it would hardly be judicious to abolish mess until better class entered as engineer students. 5902, 5914-5916. Taking into consideration different ages at which various ranks are attained, if pay were assimilated to medical branch, engineers would be satisfied; medical branch is the only one to which they could be assimilated, and although medical officers do, while engineers do not, pay for their education, if pay of engineer students were materially reduced or taken away altogether, the two officers would be placed on an equal footing. 5906-5909. Might probably be satisfied if at same ages they received same pay as executive, paymasters, or navigating lieutenants' branch; thinks would not be satisfied if received same pay as lieutenant, considering difference of age on promotion, the latter's pay stops at 10s. a-day, and engineers would not consider that an equivalent for their services after so many years. 5911-5912. Would be satisfied if assimilated to navigating branch, because then they would be promoted at an early age to the rank of chief engineer; the age for promotion to navigating lieutenant being under thirty even now. 5913. Should like to see take their chance of cabin accommodation with others of equal rank. 5917. Feeling amongst that it is offensive to have to do manual work, considered derogatory to position; proposes it should be done by engine-room artificers. 5920-5922. General mess popular with majority, but a large number would never be desirous of becoming ward-room officers; married engineers on account of expense, engineers who would apprehend not being able to conduct themselves there as they do in many cases in the engineers' mess, and a class who would be out of their element; thinks present junior engineers and the engineers of the future would prefer becoming ward-room officers. 5923-5925. Acquirements of engineers when he entered not as a rule what they are now, no educational certificate required to qualify for chief engineer, and it was not necessary to possess the high scientific attainments. 5931. Might direct manual work; demoralizing to devote high talents to duties that might be performed by workmen or skilled mechanics, but high course of education is not entitled to exempt from manual labour. 5932-5933. Although every engineer has not passed a high educational test, thinks those at present in service possess certain qualifications, and must have acquired some scientific attainments and professional knowledge since their entry, and that they are more useful to the service. 5934-5935.

Engine-Room Artificers.—Would like to have a fitter appointed to "Sheldrake"; the most valuable man in a small ship. 5805-5806. Had six in "Swiftsure"; four at a time; did duty of watching in stokehold, nearly all mechanical duties in engine-room, and drove steam

pinnacle. 5809-5811. Very likely to get one in "Sheldrake" who could work engines. 5812-5813. Not aware whether those in "Swiftsure" had certificate that they were capable of managing engines, it is necessary before confirmation; some were confirmed, but does not know if all were. 5814-5815. Feels certain are qualified to take charge of engine-room in a large ship, having had experience of abilities. 5889-5890. A great many not thoroughly trustworthy and satisfactory, but thinks as a body they are. 5903. Fitters make the best engine-room artificers; ordinary blacksmiths not a satisfactory class to enter. 5904-5905. In ships has served in, artificers have had only two opportunities of obtaining extra pay for working on board other ships. 5918-5919. In "Swiftsure" mustered with men at divisions; stokers stood in front; inspected stokers himself, and kept division list, there was no lieutenant. 5926-5930.

In General.—Is serving in "Sheldrake," 60 horse-power gun-boat, as engineer in charge. 5780-5782. Standing as engineer 1868, thinks qualified for rank of chief engineer in that year; entered service in 1861, after serving five years as an engineer boy in Keyham factory. 5783-5780, 5793. Passed educational test on entry, and qualifying educational examination for rank of chief engineer at Devonport in 1865. 5790-5791. Pay is 10s. a-day, and 1s. a-day for being in charge of machinery of "Sheldrake." 5792. Does not work on repairs to machinery of "Sheldrake," machinery being in hands of contractors; her complement is another engineer and an engine-room artificer, has not yet been to sea in her. 5796-5799. Has never been at sea in charge of engines; should keep watch in "Sheldrake" with other engineer and artificer, her horse-power is 367 indicated. 5800-5804. Last served in "Swiftsure," in her over five years; she had five engineers and four engine-room artificers; would recommend for her on reduction, one chief engineer, two or three engineers and seven engine-room artificers. 5807-5808, 5886-5818.

JOHN BESLY, Esq., SECRETARY TO THE ADMIRAL
SUPERINTENDENT H.M. DOCKYARD, DEVONPORT.

Engineer Students.—Applications for entry made to the Admiral Superintendent, who accepts any application, provided boy is of respectable character. 5937-5938. Have had to refer to referees on some occasions; candidates are not allowed to proceed to examinations by chief engineer and medical officer of dockyard unless they are of respectable character, all are examined by chief engineer and medical officer before competition. 5939-5942. Referees are occasionally referred to ascertain if references are correct; the whole of the candidates are seen when they bring their nomination papers; by present regulations all should be admitted indiscriminately to compete. 5943-5946. Candidates generally come from families residing within fifteen or twenty miles round dockyard; some occasionally obtained from north of England, but none recently, applications being under present regulations sent to Civil Service Commissioners in London. 5947-5950. Last examination took place in June or July, no applicants since November, as candidates may apply up to 1st May next; applications usually extend over three or four months. 5951-5954. Special schools advertise to educate boys for engineer students; sons of artificers in dockyard are not successful in a large proportion; boys crammed at special schools more successful than those educated at common work schools. 5955-5956. Desirable if the Admiralty wish to nominate candidates that nomination should be made there, applications being received at dockyard as at present. 5957-5958. Not thrown much in contact with after entry, but if insubordination occurred they would be punished under recent directions. 5959-5960. Indiscriminate entry has been carried on since 1863. 5961. Should prefer to see nomination, looking at class of candidates; thinks as it is at present it is a bar to young men of respectable parentage coming forward; might be limited to sons of civil officers and of gentlemen with limited incomes. 5962-5965. Would not object if a millionaire liked to put his son in; has known men who hearing who students were said they should not think of putting their sons in; half-pay officers also after hearing nature of appointment have given up doing so. Son of staff-commander and the son of a foreman in dockyard competed, the former plucked, the latter successful; dockyard labourer's son who had been educated for 6d. a-week at charity school came out first in examination, and it seems a poor gentleman cannot afford to give his son the education which some charity schools now give sons of poor men. 5966.

CAPTAIN RADULPHUS B. OLDFIELD,
R.N., C.B., A.D.C.

Engineer Students.—Has made inquiry into question about source from whence they are drawn, but has had no experience of it; should say it was satisfactory. Training is not quite what it should be, and impression is that on their return from college some practical training is requisite before they receive appointments as engineers. 6023. Recommends entry by competition after nomination by the Admiralty; has never given attention to question as to whether they should receive little or no pay during first three years of training. 6024-6025.

Engineer Officers.—Has high opinion of those who entered eight or ten years ago, having served on stations where ship had to depend on her own resources, found them very efficient in repairing engines. 5983-5986. Although promotion is slow, does not consider it is more so than in other grades; it must necessarily be irregular, augmentation and reduction being so much governed by events of the day. 5988. Would be better for themselves and service if they were promoted to the rank of chief engineer in eight to twelve years as formerly, instead of in nineteen to twenty as now. 5989. In inquiring into a grievance comparison should be made which should show clearly whether case is one of hardship as considered by officers or not. 5990. If engineers were permitted to leave service, some few would obtain employment in merchant service at higher rate of pay, but majority would not. 5991. To expedite promotion, under restriction, inducements might be offered to very few seniors and others to retire; to meet present slow rate would compensate officers more for length of service. 5992. Suggests as complement for "Warrior" one chief, six engineers, and five engine-room artificers; as regards latter, answers reservedly, not having much experience of them. 5994. Pay of engineers should be increased according to seniority and general service; over a certain standing they should mess in ward-room, and when number of juniors did not render it inconvenient, they should be gun-room officers; in small corvettes, &c., when number of engineers is reduced, and disparity of years between them and other officers is less, would advocate one mess. 6001. Aware that age of engineers entitled to promotion is steadily increasing; very heart-breaking for meritorious officers of from 38 to 42 to see no chance of attaining rank of chief engineer, and to observe officers in other grades of the service passing over their heads, but it would not be felt, except in minor degree, if length of service were compensated by proportionate increase of pay. 6020-6021. Thinks it hard that many engineers, in consequence of not attaining rank of chief engineer until late in life, are never able to count all their junior time; is of opinion all time served creditably should count towards pension, irrespective of promotion or rank. 6022.

Engine-Room Artificers.—Satisfied with those in "Achilles"; does not remember trades; they kept watch in stokehold when under way; thinks it an advantage to have added to complement of a ship. 5975-5979. Have done work well as far as he has seen; are not equal to junior engineers of five years back, but having had no experience of the engineer students now entering cannot give an opinion as to whether they are equal or superior to them. 5980-5982. Would desire to substitute for engineers, but not until he could speak from experience of their capacity; had no trouble with in "Achilles." 5995-5996. Thinks good men can be obtained for the present pay. 5997, 6003-6004. None now applying for entry; shortly after arrival at Devonport, not having any available, informed Captain of Reserve at Portsmouth, who replied that he had none. 5997-6000. One great cause of complaint is discomfort on board ship; thinks good mess-place should be fitted for, and instruction as to chief petty officers being exempted from cleaning mess-place applied to them; clothes' chest should be of same size as that of master-at-arms. 6002. Important to get good men; money question should stand in the way if it establishes a rule contrary to that which has hitherto governed service; if good men cannot be obtained for pay offered, a system of educating them should be established. 6005-6008. No difference socially if educated in dockyards, but having been brought up in service, would realise advantage of pension, in addition to wages of 5s. a-day, and find out sea life does not carry with it miseries they now seem to anticipate it does. 6009. Does not consider 5s. a-day is all a good man could earn in factory or private trade; would increase pay of artificers according to service and worth, letting it rise at end of ten years to

7s. 6d. a-day. 6010-6012. Uniform on entry appropriate, but after they have proved their adaptability to life they have chosen, sees no objection to their having one similar to that of master-at-arms. 6013. Has not considered what the relative proportion of trades ought to be; would give same pension as warrant officers, £4 a-year for every year's service. 6014-6015. Does not advocate their having charge of engines beyond a certain power, responsibility and knowledge required to work engines of a large ship beyond their capacity and education; quite competent to take charge of stokehold watch, but in some cases thinks supervision of an engineer would be required. 6016-6018. No doubt for 7s. 6d. a-day, and adequate pension, there would be many capable of taking charge at all times of stokehold in large ships, and of engine-room in small ones. 6019.

In General.—Has been captain of steam reserve at Devonport for seven months; before that commanded the "Warrior," "Royal Alfred," and "Achilles." 5967-5969. Had in "Warrior" and "Achilles" one chief engineer and four engineers, and five engineers and assistant-engineers lent; complement was sufficient for "Achilles." 5970-5974.

JOHN TRICKETT, Esq., CHIEF ENGINEER AND INSPECTOR OF MACHINERY, H.M. DOCKYARD, DEVONPORT.

Engineer Students.—Has had considerable experience in training during last ten years, as a rule are better educated theoretically than practically, though some who have taken highest places at college have been amongst best practical workmen. 6043-6044. Time they have to devote to practical work hardly sufficient, in early part of training is much interrupted by having to attend school; if wanted to be thoroughly practical men, greater time must be given to acquire knowledge; better if each student were placed with a first-class workman, who should have some consideration for giving instruction. 6045. Men not paid for instructing trade boys, but as the boys are sons of the workmen, if they are not with their fathers they are near them, so an interest is taken in them; thinks a little payment would induce men to take more pains in teaching students, and by working amongst the men they would go thoroughly through work. 6046-6047. Engine-room artificers who entered generally from factory were really first-class workmen, and better than the run of students who pass part of their time in school, besides the artificers have been several years at work after their time was out. 6048-6049. Several cases of trade boys, principally boiler-makers, entering as engine-room artificers. 6050. Does not know generally the class of society from which students come; many come from rather a humble class in life, and some are sons of dockyard men. 6051-6053. If thought desirable to enter from higher social class, several little things might be altered, washing places given, and they should not take up tickets at gates, but put down names in book as draughtsmen do; knows of large premiums being given for sons of gentlemen to enter private yards, and does not see why same class should not come into service if treated in same way; imagines would gladly adopt service as a profession if when they passed in they were recognised as officers. 6054-6056. Thinks to some extent Circular of May, 1873, has had good effect on practical training; difficulty need not arise in placing them under superior workmen; one point of inconvenience is the charging of the students' time; should be glad to see special vote taken for their training, because when time and expense devoted to teaching them are considered, their work would be nothing more than an equivalent for their education. 6057-6060. Could appoint man to look after them during time in boiler shop, they are three months there and in each shop; at present one leading man has charge of the whole of them, and is supposed to show them how to do a job of work. 6061-6064. Generally go out of yard in summer time between hour of closing and coming into school, there is a special washing place for them; in Keyham there is a dining-room, a place where they can wash, and a man in charge to provide them with tea. 6065-6069. Would be an improvement on present system if they had a week or fortnight in the shop, and then a week or fortnight in the school, supposing same proportion was kept up between hours of practical and educational work. 6070-6071. They take advantage of drawing instruction in fourth year, there is a class in the evening, and chief draughtsman attends and is paid for the extra time; all attend and go through drawing office at the end of their time. 6072-6074. Those who succeed in going to the college in five and a-half years lose six months'

practical time, if time at college is more important, then there is the equivalent; better if they can pass for them to go at five and a-half years; as a general rule those who are best educationally are the best workmen. 6075-6076. Physique is fairly good, there are many exceptions; taken as a body, a large number appear to be fine young men, but all are not; can hardly undertake to say whether care is taken in medical examination; are twice medically examined, on coming in, and on going out. 6089-6092. Not giving pay for first two or three years would prevent very needy persons coming in; if education given them, and advantages they have are worth anything, they are worth serving first three years for without pay. 6093. Not paying might keep out deserving people, but looking to value of education and training, and pay and position afterwards, persons of better position than many now in the service should be selected in some manner. 6194. Thinks can hardly give up open competition entirely, competition after nomination by Admiralty would no longer be open competition. 6195-6196. Open competition an advantage, as far as intellect is concerned; but after capabilities of candidates were ascertained, if "A" came from class it was wished to enter boys, and "B" not, both being equal in education and physique, would take "A" in preference to "B"; supposing "A" a little inferior to "B" taking him would depend on value placed on principle of selection. 6197-6199. Students do not on the whole earn wages; does not know there is want of agreement between them and men working in the shops, are sometimes a little off-hand to leading men. 6100-6102. Officer of rank of a naval engineer having superintendence of students would not work well, would not advocate arrangement. 6103. Recommends in addition to training laid down in Circular of May, 1873, a turn in pattern and millwright's shop, students would then get a better knowledge of pattern making and moulding. 6104-6107. Hand turning so little practised it is not considered necessary. 6108.

Engine-Room Artificers.—Has conducted examinations; does not remember trades entered; tests those coming from factory in arithmetic, and slightly examines in knowledge of different parts of an engine, their capabilities as workmen are perfectly known. 6027-6031. Has examined boilermakers, fitters, and sometime ago one or two copper-smiths, also one engine-smith a higher class smith than an ordinary blacksmith; all smiths in factory are engine-smiths; the angle iron smiths are called boiler-makers. 6032-6035. Thinks first-class men could not be obtained for present pay, good smith or fitter would get from 6s. 8d. to probably 7s. 6d. a-day for six days in a week, irrespective of over-time; taking into consideration advantages an artificer has, and the hardships he considers he has to undergo, probably a man would expect a little more than 7s. 6d. a-day after 10 years' service, but can hardly undertake to say. 6036-6040. Factory men who have entered of good conduct or they would not have been given a certificate. 6042. Would scarcely be a satisfactory arrangement to assimilate artificers and factory men, so that the former might be increased to form a reserve; more satisfactory if a considerable number of factory men were established, but young men would have to grow up into arrangement, and questions whether a large number of the first-class mechanics employed would not have a great objection to going afloat. 6081-6084. Examines, and amongst the best entered have been men from the Government factories, many are first-class workmen. 6085-6086. In case of war if necessary to draw engineers from, when unemployed in peace time work could be found in dockyards for, but they would displace other men; does not think would amalgamate well with factory men. 6087-6088.

In General.—Has held position of chief engineer and inspector of machinery 21½ years. 6026. Can hardly say average amount of over-time men in factory get, but a large number have been working over-time all the year; do not get corresponding equivalent in way of work for overtime. 6077-6079. In factory men are not on the establishment. 6080.

RICHARD SENNETT, Esq., R.N., SECOND ASSISTANT TO THE CHIEF ENGINEER, H.M. DOCKYARD, DEVONPORT.

Engineer Students.—Was nearly five years in dockyard before going to South Kensington as a student, and for five months in each of the three succeeding years whilst at Kensington; during the fifteen months engaged in morning at mechanical work in workshops and on board ships, in afternoons sketching parts of machinery. 6114-6116. Had instruction in drawing at Kensington for first two

sessions, had none at dockyard, students of his year going to drawing office after his leaving; would have found advantage if he had had instruction in drawing before going to Kensington, time there then might have been devoted to acquiring knowledge of more importance. 6117-6119. Never took private lessons whilst in dockyard, and science schools were not opened. 6120-6122. Hours for attendance at school are same now, except did not go to school on Wednesday; attended school in fifth year, rule then to attend school during whole of student-ship; hours of schooling same previously as during fifth years. 6123-6126. If student has to leave off in middle of work to attend school, it is likely to interfere with it, and if the work is wanted it is finished while he is away. 6127-6128. Limiting work and schooling to certain days would do, provided schoolmaster to a great extent directed style of reading by class lectures, indicating subjects to be read during intervals. 6129. Had no school in evenings after first year of time; some students went, leaving yard at six, and to get into school at seven was rather a rush; after ten hours' work in yard they were not so fit for study as if hours had been shorter. 6131-6132. There was no place to get tea or wait in, some would have found it convenient had there been; believes that an arrangement is now made, so that students living at a distance can have tea in dockyard. 6133-6135. Present system of entering is by open competition, anyone can come in; sees that evils have arisen from, but they may be remedied, and system still kept by making position such as to commend itself to parents occupying a respectable position, who would then let their sons compete. If Latin were introduced it would place examination out of reach of boys from board schools. 6136-6142. Immediate advantages of entry might be reduced, and if they were there would not be the struggle by sons of poor people, to whom pay is a great consideration, to get in; most gentlemen who bring sons up to a profession pay heavily for it, and outside service, as far as he knows, there is no profession in which pupils get money during first years of training. 6142-6143. Nomination by the Admiralty would meet the case, and be in accordance with custom in every other class in the naval service. 6144-6145. In event of its being found desirable to introduce a rather better class, suggests they enter yard a quarter of an hour after men, have a place to put serge jackets on to go to shops, and that they leave work a quarter of an hour before men, so as to be able to prepare and go out before them; should not take up tickets, but sign names in books; with regard to work for first three or four years, system could not much be improved on, are kept separate to great extent from workmen, and leading man takes charge of and instructs; in fifth year when they come back to erecting shop should be employed on big work there, they might be told off to principal workmen, who should receive 2s. a-week for instructing them. 6146. Their lordships ought to be prepared to sustain loss in work students do; leading man or foreman of a shop is responsible for so much work for so much money, and there will be temptation to keep them on inferior work on which they can earn money, and not give them superior work on which shop would lose. 6147-6148. Thinks system of giving additional instruction might be carried through all shops; trade boys who are in same shop with their fathers make twice as rapid progress as other trade boys; workmen as a rule pay more attention to trade boys than students. 6149-6151. Would be for the benefit of students if they could live and mess in dockyard under charge of naval engineer; a large proportion come from the locality, those who come from Midland counties generally take lodgings by themselves. 6152-6154. Difficult to teach principles of profession before they go to the college; do not know much about setting of slide valves, and do not seem to have hold of questions on principles of the engine; students in fifth year go round to different dockyard engines to take indicator diagrams, and they get experience in diagrams of every description, but arrangements might be made to let them work them out. 6150-6183. Could be arranged to give them instruction in steam-engine in their last three years; they have no means of acquiring it, and results of examinations show how little they know of the subject; sometimes after a trial trip is over they take a few indicator diagrams, and assist in calculating. 6184-6187. Uniform would give a position, and tend to make them more distinct from workmen. 6209. Does not know of a case of a student capable of taking high place at examination refusing to go to South Kensington, or take advantage of higher education offered. 6232.

Engineer Officers.—To make position more attractive, students of a higher social status ought to enter at rank

of sub-lieutenant, and be called engineers; thinks ought to be intermediate rank for engineers who have served five or six years and qualified for chief engineer, might be called engineers qualified for charge, passed, or staff engineers, have distinction in uniform and option of becoming ward-room officers after five years' service; an engineer should have prospect of promotion to chief engineer after ten years' service, and when about thirty years of age. 6155-6156. Not worth while promoting an engineer after 35, as he would not have opportunity of getting full time in, and if a man be kept too long in a subordinate position it to some extent unfits for a higher one. 6157. Thinks on entry ought to start with 7s. instead of 6s. a-day; an engineer after about 14 years' service should have 13s. or 14s. a-day, at present only gets advance from 9s. to 10s. a-day; is of opinion a progressive rate of pay would be better. 6158. Age at which engineers are promoted to chief engineers is from 40 to 42. Promotion would be improved if chief engineers were appointed to all ships commanded by a commander, it would add about 40; also if some inducements were offered, many engineers at top of list would go, thinks would be satisfied with 6d. a-day for every years' service up to a certain limit. 6159-6161. If a chief engineer were appointed to ship of "Fantôme" class complement might be, as there is a great deal of work, one chief engineer, one engineer, and three engine-room artificers, instead of two engineers and two artificers; at present engineer in charge does not do manual work except in case of necessity. 6162-6163. Arranged generally for each engine-room artificer to keep watch in engine-room, the engineer supervises and holds himself responsible; chief engineer would do the same, rank need not necessarily alter duties; in smaller ships, "Decoy" class, many engineers would rather be without second engineer and have engine-room artificer instead; risk of engineer going sick would have to be taken in same way as the doctor's. 6164-6167. Thinks five engineers for "Sultan" instead of nine would be ample; three, one for supervision of each watch, the senior for general duties, and one for double-bottoms, water-tight doors, &c., who should be responsible to chief engineer for safety of ship, an engine-room artificer might be made competent to do latter duty, but unless a man have something to lose you cannot make him responsible. 6172-6176. Considers it a necessity, whatever number of engine-room artificers may be, to have a body of engineers to superintend, machinery being now so complicated it requires men of responsibility and intellectual training to take charge of it. 6201. Engineers of the new rank he proposes should have option, as in case of assistant paymasters, of becoming ward-room officers after five years' service; there would be difficulty in at once abolishing engineers' mess in large ships, number of engineers being so great; better if junior engineers went into gun-room at once; notwithstanding origin of some, judging from mess at Greenwich, a great many conduct themselves in a gentlemanly manner, and there would not be much trouble with them, if number were reduced, there would not be any difficulty. 6201-6202. Many junior engineers are married, expense of gun-room mess would be about the same for them as engineers' mess; has heard engineers in charge, who were men with families, say they had no difficulty in keeping up proper position in ward-room. 6203-6204. Engineers would be satisfied if they received same pay relatively as other officers, if ages at which they reached various ranks were the same; at present chief engineer's maximum pay is below paymaster's, doctor's, or navigating officers'; Government have to train engineers, as inducements are such, proper men cannot be got to enter for present pay, taking into consideration high qualifications required. 6223. Did not get step in promotion for first-class fellowship, gained nothing beyond 12 months' time when promoted to engineer, is in same position as far as rank is concerned as if he had not been through superior course; thinks other classes at college gain step in rank on attaining honours, navigating officers get a lieutenant's commission, but engineers nothing. 6224-6226. At least 25 years before he can hope for promotion to rank of chief engineer, will then be fifty-three, and on retired list. 6227-6228. Rank as an engineer a disadvantage in present position as a civilian officer of dockyard, because chief engineers cannot be divested of idea that they are senior in rank. 6229-6231. Would not recommend that more than two engineer officers in each year should pass through high course of education at Greenwich; at Kensington there were three or four each year, and a fellow student who passed out in 1870 is still unemployed in any way in which his extra training can do him any good. 6233-6235. Best men if offered higher education at Greenwich, without prospect of appointments on shore, would take advantage of it if they were

promised early promotion to the rank of chief engineer. 6236. Would be desirable to promote engineers to the rank of chief engineers more by selection; bulk of promotions must necessarily be by seniority, but a portion might be by selection. 6237.

Engine-Room Artificers.—Shipmates with in "Crocodile," there were three, two good boilermakers, and other a sort of handyman, by trade a smith; would be almost as well to confine trades to boilermakers and fitters, the latter as a rule know a little of an engine-smith's work. 6168-6172. Aware have kept watch in engine-room of small ships, having compound engines and high pressure boilers; thinks those who have done so satisfactorily for two years might be trusted in emergency to keep watch in engine-room of a large ship, the senior engineer would hold himself responsible and keep a general supervision though not on the platform. 6177-6179. Should be treated as mechanics; grievances are with regard to leave, perhaps the greatest, and menial duties of mess; when leave is given to ship's company are often employed below, and when they come up and go to master-at-arms for him to take their names to the commander, he says, why did you not come up before, you cannot go now, being men of 25 or 26 when they enter, they do not like it; thinks would not care for position in ship if were under chief engineer and executive officers, and not the police of the ship; should have enclosed place and mess by themselves; would like to have boy told off to scrub mess and hammocks. 6188-6189. After serving for seven or eight years could command good pay outside; judging by rate of pay in factory ought to receive 8s. a-day after ten years; they think they ought to be compensated for loss of home comforts and for being away perhaps three or four years at a time. 6190-6193. Receive 3s. a-day check pay for working on board ships other than their own; men in dockyard who are getting paid for eight or nine days in the week, work over-time for it, from seven a.m. to eight p.m.; engine-room artificers are always liable to be called on, and in case of ship being wanted would have to work as much, perhaps more. 6194 6197. Thinks if a number were wanted it would be better to give them 5s. 6d. a-day on entry to induce them to come, as wages are high and trade brisk. 6198. Would not be desirable to remove from list of petty officers and promote to assistant engineers after a while, not the way to raise the status of engineers; an engineer is a man who has learnt a profession, an artificer only a trade. 6199. Kept stokehold watch at sea in "Crocodile," were in charge, with an engineer in charge of the whole watch. 6205-6207. Not many men in factory who earn 56s. a-week, but several are paid 7s. to 8s. a-day. 6208. Do not like uniform jacket; want single-breasted frock coat, similar to that of master-at-arms and writer. 6210. In "Crocodile" did not scrub hammocks, used to pay stoker to do it, but were responsible for cleanliness; second-class stoker was excused from duty to look after mess-berth; messed by themselves in forward part of lower poop deck; they had no valid reason to complain of treatment. 6211-6213. Perhaps do not sufficiently consider difficulty on board ship of making difference between chief petty officers; they look upon it from their home point of view, comfort; better to regard as mechanics, whatever rank be given them, not sure it would not be as well for them to be without rank, that not being possible, would give them rank before, or position distinct, from master-at-arms. 6214-6216. For leave and arrangements of that sort should be more immediately in connection with chief engineer, and responsible to the executive through engineer branch instead of master-at-arms. 6217. There was no difficulty with leading stokers and stokers before engine-room artificers were introduced, it was simply because they were a different class, being labourers on shore, but artificers are skilled mechanics. 6218-6219. Do not object to discipline as discipline, but at having to perform what they regard as menial duties, and have disadvantages as regards leave. 6220. On entering, if young, think more of present pay; after ten years' service think a good deal about pension, but of pay as well. 6221-6222.

In General.—Commission is dated 1867, but was at South Kensington until 1870, and obtained a first-class fellowship there. 6110-6111. Obtained a Whitworth Scholarship in 1869, the first year scholarships were given. 6112-6113.

MR. THOMAS W. RAMSAY, ENGINEER, R.N.

Engineer Students.—Has heard a great deal lately about the class from which they are taken; if anyone is

submitted (sons of dockyard labourers, and so on), it is not in accordance with the regulations, which say the superintendents are to select candidates of respectable parentage; a dockyard labourer or a private in the marines can be a respectable man, if taken in that light, any circular may be so represented. 6343-6345. Believes those entered lately have been well conducted, whatever extraction may have been; has heard are sons of dockyard labourers, private of marines, butchers, &c., but thinks from what he has seen are fitted to go at once into gun-room mess, perhaps superior class of education has given them a polish; principle would be gained by mixing with the officers, whatever manners might be. 6346-6350. Gun-room officers, with few exceptions, would not object, has known them in every ship he has been in to be a great deal in engineers' mess, and engineers in gun-room mess; indiscriminate admission was not in vogue when he entered, engineers had to educate themselves. 6351-6352. If candidates are not nominated, thinks a more careful selection should be made. 6353.

Engineer Officers.—Qualified for chief engineer seven years ago, at present rate has no hope of getting promotion; is 32 years of age, and has been in service nearly thirteen years. 6271-6274. Promotion of engineers is not satisfactory, suggests to improve that chief engineers be employed in all steam-ships, and greater inducements to retire be given to senior engineers not qualified for promotion; if number of engineers be reduced, would substitute by engine-room artificers, who could do work of junior engineers. 6275-6278. Thinks very few engineers of, or over, 35 years of age would go if offered pension now due to them, would expect 6d. a-day for every year's service, sea or harbour service counting the same. 6279-6283. Would increase pay of engineers at same time, according to their service, thinks would not be an inducement for them to remain after twenty years' service, and that a retiring allowance of 10s. a-day would compensate those who were compelled to retire over the age of 40. 6284-6287. Would greatly check retirement if it were made a condition they should serve again in case of war; if additional engineers were then required, almost impossible to get them from any other source than private trade, and higher pay would have to be offered to induce them to enter temporarily. 6288-6292. An engineer ought to be made a chief engineer not later than 35; all time from first entry should count; if men were promoted at 32 to chief engineers, they would get the higher rate of pension, which at present they cannot obtain, not being able to get in eleven years' time, and Mr. Childer's scheme would then act for engineers as it does for other branches of the service. 6332-6335. By doing away with engineers' mess, service and engineers would be benefited; junior ranks might support expense of gun-room mess, but it would be necessary to increase pay of seniors to meet additional expense of ward-room mess; after engineers at top of list were induced to retire, and the number in each ship reduced, remainder might go into ward and gun-room messes. 6337-6340. In event of war a greater amount of pay than present rate in service the only thing to induce engineers from merchant service to enter, would be an inferior class then, as merchant service would outbid us if they wanted the men. 6341-6342.

Engine-Room Artificers.—Had in both "Minotaur" and "Wolverene"; there was one artificer in "Wolverene," 400 horse-power nominal, she was his first ship; in latter part of commission he kept watch in engine-room, in early part kept watch in stokehold under the senior engineer. 6249-6255. Artificer performed work in charge of engine-room very satisfactorily, was a fitter by trade, and served time in private trade; had no knowledge of marine engines before he joined "Wolverene," when he was on duty senior engineer was responsible for the watch. 6256-6262. In "Minotaur" there were four; trades, blacksmith, fitter, boilermaker, and copper-smith; three were good men, the boilermaker the least useful. 6263-6267. Thinks pay is not sufficient to induce good men to remain, suggests it be increased according to length of service; 7s. a-day would induce to re-enter after ten years, with further increase of 1s. a-day after another five years. 6293-6296. Have complained of treatment and position in every ship he has served in; complain of scrubbing mess, of size of chest, and also with regard to hammocks, they have to pay hammock-men to scrub them, or to do it themselves. 6297-6303. Pay is not high compared with what they would receive on shore, average pay of a workman on shore is 5s. to 7s. a-day; 6s. a-day on shore is not worth more than 5s. on board, because there is uniform to keep up, and other expenses to incur. 6307-6311. Should receive 5s. 6d. on entry, to

rise to 7s. or 8s., according to service; thinks it would be a great inducement for them to remain if they were certain of receiving 7s. 6d. a-day after ten years' service. 6312-6313. Pension would be an inducement for them to re-engage after first ten years, instead of going into merchant service for which then they would be fully qualified; on first entry do not much consider chance of pension; thinks would be satisfied with one of 4s. a-day at end of twenty years' service. 6314-6318. Complain about jacket as uniform, would prefer coat similar to that of chief petty officers of same rank. 6319. Would receive £10 to £35 a-month as chief engineers in merchant service, a good fitter could become a chief engineer if he remained in the same company long enough. 6321-6322. Comfort and more pay is the question with; present pay is the principal inducement for them to enter, but they take pension into consideration; think more of pension at end of ten years, having then only a comparatively short time to serve for it. 6328-6331. With a proper selection, provided pay be increased, and certain advantages be given, a competent class could be obtained to take charge of engine-room watch in a vessel of same class as "Wolverene." 6336.

In General.—Attached to "Indus," in charge of working parties in steam reserve; standing as an engineer six and a-half years; pay is 10s. a-day; does not receive charge money; has 1s. 6d. a-day compensation for provisions. 6238-6243. Last ship "Wolverene"; was senior engineer in her, there was a chief engineer in charge; served before that in "Minotaur," an ironclad. 6244-6248. Entered service in 1863, from private trade, was just out of his time. 6268-6270. Has not known anything about engineers in the merchant service for the last thirteen years. 6320. In "Wolverene" executive officers had charge of stokers for divisions; there were engineers besides the chief, they mustered on quarter-deck at divisions, and had nothing to do with men. 6324-6327.

MR. VALENTINE HORNE, ENGINEER, R.N.

Engineer Officer.—Standing as an engineer, 1865, has been in service nearly seventeen years; not qualified for rank of chief engineer, because he hopes to retire in six years' time, when 45 years of age; shall then have £180 a-year as pension. 6354-6360. At time of joining service expected to be made a chief engineer in ten or twelve years, average age for promotion was then about 30; 6263-6364. If allowed to go now present retirement, £92 a-year, would be rather too small, but if allowed 6d. a-day for every year served, £150 a-year, should retire, and think should do so even if offered immediate promotion to chief engineer. 6366-6371. Was senior engineer in "Vanguard"; occasionally took part in the manual work, because it had to be done and there was no one else to do it, but the engineers. 6388-6389. Had experience of a young acting second class assistant engineer for a few weeks in "Vanguard," was able and willing to do his work and a most energetic young officer, high education did not stand in his way with regard to work; he kept a stokehold watch during cruise, there was an engine-room artificer with him as well. 6400-6403. Engineers are satisfied with mess arrangements in new class of ships, such as "Iron Duke," "Vanguard" and "Achilles," where they have a very good mess-berth, but for other reasons would care to be moved into ward-room, they complain of position, not accommodation; ward-room more expensive, and perhaps many married engineers would dislike it on that account at present pay. 6404-6407. Object to being pensioned instead of being placed on the retired list, wish it altered. 6408-6410. Age at which an engineer should be promoted to chief engineer, 30 to 32. 6423. If number were reduced and engine-room artificers substituted, thinks perhaps in event of war lists would not be sufficiently elastic; an eligible class of engineers might be obtained from merchant service, but knows very little of that service. 6424-6428.

Engine-Room Artificers.—Had one permanently in "Vanguard" and two lent for cruise; two were engine smiths by trade, one a fitter; one came from Devonport Dockyard, another from a private firm. 6372-6378. Fitter or engine smith most useful trade in a ship; in two cases found engine smiths were very good men, able to work as copper-smiths and turners, and could do boiler maker's work if necessary. 6379-6381. Has heard of their keeping watch in engine-room in small ships; thinks it would be for benefit of service if number were increased and engineers reduced; could take duty of junior engineers, except in large ships, where an engineer should always be in charge of the watch, but might do duty in stokehold. 6382-6387. The few he has met have been very good.

workmen, but seem dissatisfied about treatment in some cases, and has heard complaining about mess matters; sometimes may be their own fault; sent for one to know why not in engine-room at proper hour, and informed he was obliged to see mess scrubbed and cleaned. 6395-6397. Thinks would be contented to mess as they do at present, with schoolmaster, writer, and other chief petty officers. 6398-6399. Believes would be much more satisfied if a few little details were attended to in ships with regard to their position and messing; has not observed anything to lead him to suppose police of ship were down upon them, thinks they received similar treatment to other chief petty officers; engine-room artificer of "Vanguard" (who gave evidence) was not good tempered, hasty, but very hard working. 6411-6414. Might get on better on lower deck if there were a little more of the give and take principle on both sides; with regard to leave, if not on good terms with master-at-arms, the chances are he would not go to commander at the time they wanted it, and the opportunity would be lost. 6415. As regards relative rank, sees no reason for them to complain; in large ships always have a place for study in, there is a reading-room and generally plenty of room there. 6417. Never found in "Vanguard" they were unreasonably interfered with; appear to be friendly with messmates, and heard no complaint in that respect; complain about chests, are small for requirements, men often having private tools which they carry with them for tinsmith's work and so on. 6418-6422.

In General.—Served time in West India Mail Company's steam factory, Southampton, joined service nine or ten months after time was out. 6361-6362. Engine-room complement of "Vanguard" was six engineers and three engine-room artificers, with fewer engineers it might be four engineers and six engine-room artificers, adds one artificer as work might be found for him, but it is not absolutely necessary. 6390-6393. Had general supervision of double-bottom and water-tight doors, but an engineer was specially appointed to take charge of and examine them, and they were under his control. 6394.

MR. J. F. BABB, ENGINEER, R.N.

Engineer Students.—Went to school in dockyard as engineer boy, before becoming a student, attended voluntarily. 6464-6465. Received 8s. a-week as engineer boy, is the same as students get now; was admitted by nomination and competitive examination, obtained nomination from Secretary to the Admiralty. 6483-6486. Was in dockyard when regulation for indiscriminate entry of students was established, it has not been a good thing for service; suggests nomination by Board of Admiralty instead. 6487-6489. Indiscriminate entry has been a great bar to introducing to gun and ward-room messes. 6490.

Engineer Officers.—On entry thought it possible to become a chief engineer after 15 years. 6465. Present promotion is not satisfactory, want fair flow of, progressive pay and increased pension; now an engineer would not get more than 10s. a-day after 25 years' service; if promotion were guaranteed at from 30 to 35 years of age it would be a remedy. 6469-6472. An engineer ought to be promoted to chief at 35; if after three years' service were offered promotion to chief, or retirement on 6d. a-day for every year's service, would take promotion, would be best thing at his age, 29, and should not have slightest hesitation about remaining. 6473-6476. "Raccoon" the largest ship has served in; messes in her in engineers' mess; would like to be transferred to ward-room or gun-room mess. 6477-6479. Having held rank as engineer four years thinks is entitled to go into ward-room mess; would be better to mess for first five years in gun-room, and after that in ward-room. 6481-6482. Pay should be increased on entry, should be increased to 7s. a-day, 6s. a-day not being market value; in speaking of market value retirement is a great point; would waive increase of pay on entry, if permanent employment, progressive pay, and other advantages were conceded. 6491-6494. Has met lately some of the young engineers from Greenwich; their mess there is not popular, they wish to be in a general mess. 6494-6499. They, as boys, during their six years in factory, receive superior education, which tends to refine them and makes them more fit for admission to senior officers' mess; if their bad associations when at home be taken into account, the many suffer for the few; if could be admitted to general mess when at the College would then be fit for gun-room mess. 6530-6501. A great object with to be "retired" instead of "pensioned," would then be placed in same position with officers of relative rank, appear in Navy List, and not have to come to dockyard for pension with

ships' cooks and others. 6502-6504. Has not served lately in ship with gun-room mess, there was none in "Nimble." 6505-6507. Would be advisable to reduce number and replace by artificers; should have liked two artificers and one engineer in "Nimble," in addition to engineer in charge, instead of three engineers. 6514-6516. No chance of becoming a chief engineer for 20 years, would then be 49, and could retire at 45. 6514-6517.

Engine-Room Artificers.—Never been shipmate with; has had no experience of their work in dockyard; thinks if more are wanted can be obtained when they have better advantages; more than are wanted can be obtained now of a certain class, but they are not good men. 6454-6459. Thinks great bulk will leave at end of first 10 years, unless pay and position are improved; greater difficulty perhaps in retaining than obtaining. 6460-6462. Has had no experience of afloat; has seen good deal of them in "Calliope"; thinks them average workmen; would be fit to take charge of stokehold watch after experience at sea, would not allow them to take charge of engine-room in a ship larger than "Dryad" or "Daphne" class. 6508-6513.

In General.—Standing as an engineer, 1871; is now serving in "Hydra," is the only engineer in her. 6426-6429. Entered as engineer boy in 1861; became engineer student in 1863, and assistant engineer in 1866. 6430-6434. In 1863 all engineer boys became engineer students; took a 1st class certificate, gained 12 months' sea time for promotion thereby, but it does not count for full, half, or retired pay, and it would not if he remained chief engineer for 11 years. 6435-6442. When he passed out, South Kensington students were established, but none of his batch went there, because they failed to pass the examination. 6443-6445. Last ship "Nimble"; she had an engineer in charge, and another besides himself, but was not allowed artificers; with the other engineer did all the repairs and kept watch and watch for five months. 6446-6451. There is no mess in "Hydra," lives on shore; is married. 6466-6468. Has served 9½ years. 6473.

G. F. BELL, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Is acquainted with mode of practical training in dockyards, thinks mechanical part of the training should be better looked after. 6569-6571. Enter by competitive examination; believes they have to give certificate proving they come from respectable families; social class from which they are drawn is not satisfactory; should be appointed by nomination. 6575-6578. If entered by nomination, many in middle classes, clergymen and officers would enter their sons. 6616-6617. During training are put into each of the shops; are not kept so constantly at work as men trained at Messrs. Napier's. 6622-6623. When he left Messrs. Napier's was not able at once to drive marine engines, learnt to do so on board ship; considers students are fitted to take charge of watch when they first come on board; dockyard training the best they could have if they were made to go into practical part more. 6624-6628. When with Messrs. Napier was merely under general supervision of leading man; took part in general work, had no special instruction except that received at home. 6629-6631. Received 5s. a-week first year, and increase of 1s. a-week each year afterwards; after five years had 9s. a-week; no premiums taken for apprentices. 6632-6636. Did not work in boiler-shop, training limited to fitting, turning, and drawing; only did smith's work for amusement. 6637-6639.

Engineer Officers.—Was 37½ years of age when made a chief engineer, was promoted by seniority; entered in 1854, as 3rd class assistant, after serving time with Messrs. Napier of Glasgow; expected to be made chief in eight or ten years after entry, calculated time from Navy List. 6543-6551. Thinks young engineers are not such good workmen as when he entered; should say engine artificers are better workmen than young engineers. 6552-6553. Would reduce number of engineers and substitute artificers, thus causing quicker promotion. 6554-6555. Messed with engineers in "Crocodile"; chief messes in saloon with other officers. 6572-6574. Thinks pay of engineers should be increased periodically, and that of chief engineers increased according to service. 6587-6588. In "Crocodile" had 9s. a-day for first part of commission, and 10s. for last six months, the highest pay an engineer could reach; promoted shortly after leaving "Crocodile"; was between 37 and 38 when receiving 10s. a-day. 6589-6592. Will have three engineers in "Opal"; engineers generally would like to mess in gun-room on joining, and to do away with engineers' mess; thinks it possible, and that it would do to put present class of officers in gun-room; knows social class from which they are generally taken. 6611-6616.

Engine-Room Artificers.—Tradé would like to have in "Opal" fitter; no artificers in last ship; has been shipmate with in "Crocodile," was senior engineer in her for three years and four months. 6525-6529. Had three artificers in "Crocodile," they kept stokehold watch, did no duty in engine-room while he was there; knew their work well; two were boiler-makers, the other a fitter; boiler-makers knew their work better than the fitter; fitter came from private trade, boiler-makers from Portsmouth Dockyard. 6530-6541. Artificer would be capable to take charge of engines of small vessel; there will be three engineers to keep watch in "Opal"; to train artificer shall let him keep stokehold watch with one of the engineers; desirable to train in charge of engines in case an engineer becomes sick. 6556, 6558-6560. Most desirable for fitters, boiler-makers, blacksmiths, and coppersmiths to enter service; boiler-maker did blacksmith's work in "Crocodile"; had no blacksmith among the stokers; thinks did not make use of ship's blacksmith. 6561-6564. Has been shipmate with a stoker mechanic blacksmith; would elevate trade of blacksmith to same rank as that of fitter. 6565-6566. Engine-smith better than a common smith; in taking blacksmiths would specify engine-smiths. 6567-6568. Artificers were discontented in "Crocodile," had no servant to wait on them, unless chief engineer allowed them a stoker, which he did that he might have their services; had no mess place, messed by themselves on lower troop deck; suggests that they should have separate mess place, or mess with chief petty officers. 6579-6584. Master-at-arms has mess place to himself in most ships, ship's corporals being allotted to chief petty officers' messes. 6585-6586. No special mess place in "Opal"; supposes artificer will mess in one of the lower deck messes; should mess with master-at-arms. 6600-6601. Does not know whether there is a schoolmaster in "Opal"; thinks artificers and master-at-arms would get on well together in same mess; artificers should not go into mess unless clean. 6602-6604. Would wash in stokers' bath-room; will have four stokers and one leading stoker in a watch, thinks there are no means of letting artificers wash in bath-room before stokers. 6606-6608. Artificer not yet told off to join "Opal." 6610.

In General.—Is chief engineer in "Opal"; has been chief five years next month; "Opal" 2100 horse-power; was last in "Vigilant" as chief engineer. 6518-6522. Will have complement of three engineers and one artificer in "Opal," but as yet only one assistant engineer appointed. 6523-6524. "Opal" has six compartments, and several small ones within these, she has no double-bottom. 6593-6594. Will give charge of water-tight doors to one of the engineers; doors on lower deck close upon hinges and catch with bolt, others are sliding perpendicular doors or horizontal, winch work is on upper deck. 6595-6597. Knows doors are close shut by tell-tale upon the top; it takes three minutes to close the screw passage door. 6598-6599. Was five years with Messrs. Napier at Glasgow, first in fitting and erecting shop, then in turning shop and drawing office, and was employed on board ship to put in machinery; came direct from Messrs. Napier's into service. 6618-6621.

ORESTES N. BROOKER, Esq., CHIEF ENGINEER,
R.N.

Engineer Students.—Evidence of respectability should be considered; not conducive to interests of service if it be made possible for an engineer on the platform to give orders to his father in the stokehold; students ought to be nominated by Board of Admiralty, if not there should be safeguards to ensure people of a higher social position being obtained. 6682-6684. Safeguards should be, giving no pay for first three or four years, examination in London, introduction of a classical examination, and translation of English into French, would all be barriers and shut out cramming now going in Portsmouth; preliminary test also should include first six subjects, and successful candidates ought to have some little privileges and be treated in a different manner in dockyard. 6685-6686. Should have time and place to change dress before leaving dockyard; marrying before expiration of time a great evil, a condition against could be introduced in indentures of future students. 6687-6688. Have only one instructor, and one is not sufficient; thinks instructor should not be taken from same yard as students; recommends one instructor for each branch of trade, also that marks be given for practical ability; examination to be as now, but to include Latin and one Continental language; successful candidates at end of six years' training to have term at Royal Naval College as

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engineer cadets, when there, first ten in examination to receive 6s., the remainder 5s. a-day; to be appointed assistant engineers by commission, taking seniority from marks gained in the College; is supposing a better class will enter, and proposes should go into gun-room; when scheme is developed there will not be so many engineers; their mess will be abolished, and they will not swamp gun and ward-room; has increased bond to prevent their leaving service, regrets it is necessary, but it shows inducements to remain are small. 6691-6698. Would be desirable for them to mess in dockyard. 6774. Suggestions in detail relative to their entry, education, examination, pay, &c. 6778.

Engineer Officers.—Pay is now 22s. a-day; was nearly 30 years of age when promoted to chief engineer, but was very fortunate; should count 25 years if retired, losing 3rd engineer's time, four years; has completed 11 years as chief engineer, which enables him to count all junior time allowed. 6644-6645, 6651-6653. Would not wish promotion to rank of inspector of machinery, no prospect of employment for two or three years, and pay would be no more than a chief engineer's with charge money; the pay would be 25s. a-day only, half-pay 16s.; promotion was given him, but he declined, and it was cancelled. 6654-6658. Promotion of engineers is anything but satisfactory, to improve, thinks an assistant engineer ought to be promoted to engineer after three years' service, and pay should be progressive; no engineer over 40 should be promoted to chief engineer, but engineers after 14 or 15 years' service ought to be, does not see any way of doing it unless half the present engineers are retired, and engine-room artificers substituted for them. 6659-6661. Would reduce list of engineers by a temporary measure, and gradually after entering engine-room artificers. 6670-6671. Would increase list of chief engineers to give greater flow of promotion, putting them into ships with engines of about 700 indicated horse-power; thinks every ship commanded by a commander should have a chief engineer. 6672-6676. Has not found junior engineers on first joining capable of keeping engine-room watch, practice to put in stokehold, to train to keep if number of engineers were reduced, would after serving their time send on trials of all ships, and to experiments in dockyards; on trials if made to give special attention to engine-room and stokehold, instead of working telegraphs, taking temperatures, carrying messages, &c., would obtain a great deal of information, which would be supplemented by instruction by chief or senior engineer. 6679-6681. Thinks senior engineer of a large ship ought to receive 1s. a-day in addition to pay; charge pay should be 1s. a-day for every 1,000 indicated horse-power, and 1d. for each hundred between the thousands, going up to 8s. a-day for the "Alexandra." 6698-6703. Pay of chief engineers ought to commence at 14s. and rise to 24s. a-day, and they should serve three instead of five years for 16s. a-day half pay. 6704. Charge pay would not increase estimates by more than £1,100 or £1,200, great satisfaction would be given by increasing it, and good engineers would be induced to apply for large ships, chief engineers in harbour being so much better off than those at sea as regards expense. 6705-6707. All time should count towards retirement, full and half-pay. 6707-6710. Inspectors of machinery ought to be under 50 when promoted, and have obtained a first-class educational certificate; they should be appointed to all stations and fleets having admirals in command, and it would be advisable to have at dockyards at such places where ships do not move in squadrons. 6710-6713. Proposes pay of inspectors should be 32s. a-day when in charge of a fleet, 35s. after five years' service; half-pay 20s. a-day under five years, and 23s. after five years' service; chief inspector's pay when in charge of steam reserve to be 35s. a-day, and 38s. a-day after five years, half-pay 23s. a-day, and 26s. after five years; retired pay in the same proportion. 6713-6714. If complement of engineers be reduced a properly qualified engine-room storekeeper, with pay of 2s. 6d. to 5s. a-day should be appointed, an engine-room artificer would do if specially appointed. 6714-6716. If it were desirable to raise social status of the engineers, it would be beneficial for them to mess and reside in dockyard; might have ship alongside if they could not have a college, but thinks those coming from foreign service and married men would prefer going to their homes. 6772-6774. Is married; has mess in "Volcano" for engineers in what was formerly the gun-room; have no cook, but take luncheons on board. 6775-6778. Gives details of suggestions relative to supply, pay, charge money, promotion, retirement, &c., of engineer officers. 6778.

Engine-Room Artificers.—Is sure there would be

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economy in entering and reducing staff of engineers; had three in "Crocodile"; work was completed by them in two thirds of the time it otherwise would have been, and if not well done they could always be sent for and made to do it efficiently; once when repairs to boilers were estimated by dockyard at £400, managed to get work done by the engine-room artificers alone, and considered the £400 was saved to the Government. 6661-6662, 6668-6669, 6765. Would not have on platform of any engine-room until had been at sea for three or four years, and should never take charge of engines beyond a certain power except in cases of great emergency. 6677-6678. Suggests should be examined on first entry in order to ascertain they are fully acquainted with their own trade; has known an inefficient artificer entered, it could be prevented by having candidates examined in the steam reserve. 6717-6723. Pay should commence at 5s. 6d. a-day, and increase 6d. a-day for every five years' service. 6724-6725. Would give £70 a-year pension, right to depend on service, but proposes two classes. 6726-6729. Should have separate mess berth and servant, and larger chests. 6729. Should prefer from the private trade; when advertised for should be informed are paid for Sundays, as some of those who came to "Volcano" thought that 5s. a-day meant 30s. not 35s. a-week. 6730. Would alter circular respecting qualifications, as if carried out strictly very few would enter; a very wide field is opened out by "how to act in any of the ordinary casualties occurring in the engine-room," and candidates do not feel disposed to try examination; also an artificer could not be expected to take charge of engines of an ironclad in 12 months, yet he must obtain a certificate from his captain to that effect before being confirmed, would take out or alter to "stokehold watch." 6731-6732. By giving pension of £70 a-year should be able to retain to end of their time. 6733. Recommends a certain number be selected for their superior mechanical skill for the higher grades of leading pattern maker, fitter, boilermaker, smith, copper-smith and moulder, and that they be appointed to flagships and steam reserves, giving them 1s. 6d. a-day more pay, and £10 a-year more pension. 6733-6736. About 16 at work in floating factory, including those in workshop, there is full work for them; could keep employed 20 more in floating factory, 20 more in the workshop, and another 20 in other parts of the steam reserve. 6737-6749. Would be an inducement for men to join and become reconciled to service, if after a few years afloat they were sure of employment in steam reserve; could employ more than 30 with advantage, if considered desirable to form reserve of to supplement engineers in time of war; work done in steam reserve relieves factory so far. 6750-6754. To ascertain an artificer was capable of taking charge of a watch in the engine-room, would let him pass an examination at the end of four years; has known some who have performed the duty satisfactorily in small vessels, but thinks they had been six years in the service. 6756-6760. Suggests might be called "machinists," as in American service, to distinguish them from some of the other artificers. 6760. Would not enter blacksmiths, and only a limited number of engine smiths. 6761-6762. Complaint of short jacket as uniform; might have a frock coat or cutaway coat, prefers cutaway. 6763-6764. Principal complaints pay not being progressive, and consider are interfered with too much by master-at-arms; experience as regards latter point is that they are in a great measure correct; was able in "Crocodile" to make them comfortable through influence with captain; in "Sultan" mess place is a great improvement; are kept away from lower deck, and not under influence of master-at-arms; in the power of master-at-arms to be very severe with and make uncomfortable; if put under charge of senior engineer and in separate mess a great deal of complaint would be done away with. 6766-6767. Proposes should mess by themselves, and have a man to attend on, clean mess and cook for them; would meet wishes if two stokers messed with them and were responsible for cleanliness of mess, but then chief engineer loses two men from his complement; have not been accustomed to clean mess, scrub hammocks, &c., the same as chief petty officers. 6768-6771. Details of suggestions for the supply, pay, pension, &c., of. 6778.

In General.—Belongs to the "Asia," for service in charge of the "Volcano" floating factory; last served at sea in "Crocodile," troopship, for 4½ years. 6640-6643. In "Crocodile" had eight engineers, exclusive of himself the chief, and three engine-room artificers; would recommend for her a chief, four engineers and seven engine-room artificers. 6663-6666. Thinks mechanical pay of stoker mechanics might be advanced to 6d., a great many men being worth something more than 3d.; it would bring pay

up to about 3s. 4d. a-day, but should only give it under sanction of steam reserve, where it can be seen if a man is worth the money. 6764-6755.

JAMES A. BEDBROOK, Esq., R.N. ASSISTANT TO THE CHIEF ENGINEER, H.M. DOCKYARD, CHATHAM.

Engineer Students.—Thinks there are thirty-four now at Chatham. 6781. Not satisfied with mode of entry, nomination should be given by the Admiralty. 6792-6793. Thinks should not be treated in the same way as trade boys; would be beneficial to service to treat differently altogether, and to look more after practical training, are now merely under charge of a leading man. 6794-6795. Suggests a naval engineer be appointed at each dockyard to train and to look after schooling. 6796-6798, 6806-6809. Does not think improvement could be made upon what is done at Chatham in training as workmen, they turn out very good hands, but are looked after very strictly. 6799-6801. Would be beneficial to subject to certain amount of naval discipline during studentship, acquire home tastes by living at home up to age of manhood; service rather distasteful to on coming in, and do not seem to like submitting to discipline; should reside and mess in dockyard, under charge of a naval engineer. 6802-6803, 6841. Learn as much as trade boys at Chatham, have only a limited time at each trade, but make very good progress indeed. 6804-6806. During time at Chatham have no instruction in the mechanism of the steam engine, very desirable they should have; are taught as much as possible, to enable them to work up to practical engineering papers given by Admiralty authorities, by employing on board ships and taking on trial trips. 6810-6814. Does not like look of list of parentage of those who have entered of late years, fact renders it difficult to introduce at once into gun and ward-room messes. 6837-6839. Very advantageous to treat differently, considering position they will occupy. 6840. Can hardly employ those at Chatham, not sufficient engine work, by and bye there will be more, and more can be employed; every opportunity is taken of employing them on any suitable work. 6852-6853. Thinks if better class were entered, they should mess in a college or on board a ship, idea being to subject to naval discipline from youth to manhood. 6854. If a great stimulus were given to enter service, there would be no need of indentures, five or six have left Chatham, giving as a reason distaste to seafaring life; if weaned from home tastes at early age would be more inclined to enter. 6855-6857. Those who left did not pay forfeit, they had four or five years' education for nothing, but students now cannot go; thinks their going points to fact that there is hardly sufficient inducement for them to remain in service, they choose lower position outside in preference to going to sea as engineers. 6858-6860. Believes they earn pay in fitting shop in most cases and during last part of time. 6861-6862. Thinks it is both distaste for the sea and want of inducement that prevents their remaining in service. 6863.

Engineer Officers.—Thinks isolated mess system is very objectionable; senior engineers should mess in ward-room, juniors in gun-room, would require increase of pay on improving position in this respect; engineers' mess frequently very dark, and not a nice place to retire to after being relieved from duties, gun-room better in cases he has seen, it is crowded, but if number of officers were increased supposes accommodation would have to be. 6823-6825. Theoretical education almost nil in dockyard; receive very sound theoretical education at Greenwich, but time there is short as compared with time in dockyard; does not consider education is too high. 6826-6827. Thinks largest half of the engineers who passed through South Kensington is at sea. 6828-6829. Pay of senior engineers should be higher. 6830-6832. Wishes engineers to be introduced into gun and ward-room messes, but has some doubts as to whether they could be at once, as they are so mixed up now with workmen at just the age they are most susceptible of acquiring bad habits; many are married amongst their own class; some are the sons of naval officers. 6833-6836.

Engine-Room Artificers.—Some are entered at Chatham and employed in steam reserve floating factory; has frequently examined verbally. 6815-6819. Usually sent on board floating factory in order to see what they are capable of doing in their own trade; very few have entered from factory, one or two fitters and blacksmiths. 6820-6822. Has had no experience of, except in the non-practical part of their examination. 6842-6844. Indentures and characters after serving their time are taken as

evidence that they are good workmen, not sufficient evidence at all times to insure obtaining the proper sort of workmen; has heard of men with inferior qualities being admitted, thinks it has frequently occurred; chief engineers have said artificers were not up to work expected. 6845-6851.

In General.—Standing as an engineer, 1869, became an assistant engineer in 1864; entered Portsmouth yard in 1859, thinks was then called a factory boy, served about a year as an engineer student; went to South Kensington from 1864 to 1867, and took diploma of third class fellow. 6780-6790.

CAPTAIN CHARLES FELLOWES, R.N., C.B.

Engineer Students.—Draws attention to position previously held by, and still held by a large number; many after receiving the best education for five years demand discharge and go away to private firms. 6896. Raised question about their paying £250 to leave service, thinks it will stop their demanding discharge, but many have left, and those who are now being educated on old scale should be called on to enter into bond or told they might go. 6897-6898. Training they receive in practical work in fitting shop very satisfactory for them; it is a good training; are well looked after, the rules applied to them being strictly carried out at Chatham; students in their fifth year are sent from Sheerness to study ship-building for six months, and have two afternoons each week for drawing to illustrate what they have learned. 6899-6902. Applications for entry are brought before him; should not consider he had authority to reject a candidate on account of social position, but could refer to their Lordships. 6903-6905. Not exactly aware of parentage of students; understands greater part at Chatham are sons of people working in the factory, also the same at Devonport, where the entry of the sons of really respectable people in the factory was encouraged. 6906-6908. Thinks, looking to future position and to desirability of their entering gun and ward-room messes, it is not a satisfactory class from which to draw them, and, if possible, they should be obtained from a higher one; if greater inducements in shape of pay and position were held out to the engineers, a better class would be obtained, now a man remains 20 years before promotion. 6909-6910. Would keep out classes that have hitherto come in by nominating in same way as naval cadets; thinks then a very respectable class would be obtained, knows many engineers in the Peninsular and Oriental Company who are perfect gentlemen, though many do not hold position men in the navy hold. 6911-6912. A mistake in supposing young engineers we have are to do the work of experienced engine-room artificers; his most able assistant at Keyham dockyard always said after doing all he could to make students good artificers, in nine cases out of ten they were not equal to engine-room artificers; if specimen of work from Portsmouth shown him was done by hand there must have been a loss of labour, but the man who did it was a *rara avis*, and it is not usual. 6922-6925. Perfectly certain sons of gentlemen would enter, if class were improved by nomination by Admiralty; would be difficult to provide a place in the dockyards for students to live and mess in, but there would be no difficulty if they were placed under the authority of the steam reserve, as they could be put into a vessel fitted for the purpose. 6935-6938.

Engineer Officers.—Does not think promotion is in a satisfactory state, expectations of the engineers on entry have not been realized; was not aware an engineer was now 42 or 43 years of age before being promoted to the rank of chief engineer. 6867-6869. Suggests should be placed on a totally different footing by making them executive officers after certain service, men-of-war being now floating machines, and more or less under the direction of the chief engineer, who is a different officer to what he was in years gone by, and an officer who should have the power of giving an order without the possibility of its being disobeyed or even questioned; would reduce number of engineers and increase engine-room artificers; engineers are not treated in manner suitable to rank, looked on in a way it would be well to remove them from, letting actual manual labour be done by artificers and supervision by them. 6870. Sub-lieutenants and midshipmen should be obliged at certain periods to keep their watch in the engine-room for a week attached to a chief engineer, but so long as the latter remains a civilian officer he can never have control over them; makes suggestion in order to give them practical knowledge of that part of their profession;

should keep watch under engineer in charge, assisting to reduce or increase number of revolutions and so on, but not be responsible in any way. 6871, 6886-6887, 6947-6949. In double ships such as the "Alexandra," two engines, each 700 horse-power nominal, officer in charge should be an inspector of machinery, but at same time chief engineer, having under him two senior engineers, one for each engine, six watch keepers, and one junior engineer for keeping capstan, steering, and all other engines outside engine-room in order. 6871-6872. Making executive officers should carry position with it, means by it they should be on what is termed the military branch, instead of the civil; a chief engineer should succeed to command of a ship, if by any possibility circumstances could throw him in that position, and take rank in rotation according to the ideas on the subject. 6877-6885. Would be a necessity that senior engineer should have military command if sub-lieutenants and midshipmen were compelled to keep watch in the engine-room. 6886-6887. Chief engineer of course responsible for all, and must have an experienced engineer for each side of ship; there are in "Alexandra" four separate stokeholds, three boilers in each, and two engine-rooms door between, which would be closed in action, the communication being by engine-room telegraph, chief engineer and engineer have been appointed in order to learn arrangements. 6887-6891. If proposed change were made in "Alexandra," two senior engineers should have cabins, and mess in ward-room, the other engineers in gun-room; would do away with engineers' mess and pantry, and devote space to senior engineers' cabins; increase to gun and ward-room could be met. 6891-6893. Thinks in event of war there would be no difficulty in getting engineers from the merchant service. 6894. Pay of engineers ought to be increased, and they should have more to look forward to in higher ranks, as a chief engineer is now responsible for so much; wanted, when proposing chief engineer of a large ship, should have rank of inspector of machinery, that inspectors of machinery should be appointed to vessels with valuable engines; "Temeraire," when complete, will be a mass of machinery. 6926-6928. Has heard one great grievance of the chief engineers is not being allowed to count some portion of their time, but has not gone into subject. 6929. Thinks pay of 6s. a-day is very good on entry, education having been received at the Government expense; would make pay progressive. 6930-6931. Gallantry in action, readiness in resource, and so on, should guide age at which an engineer should attain the rank of chief; would promote to a certain degree by selection, but engineers should have certain qualifications and service; did not expect to hear seniority strictly was preferred by the engineers. 6932-6934.

Engine-Room Artificers.—Actual manual labour in engine-room should be done by under direction of engineers; should be brought up in service, or taken from labouring classes of artificers who now present themselves, but in latter case only a few, as they wish to remain at home to reside with families; if were paid well and according to service, a superior class of working engineers would be obtained; highest rank should be that of chief petty officer. 6870-6871. Would not allow to take charge of stokehold in ship of "Alexandra" class; after four or five years' service as useful in stokehold as a young engineer just joined, but should be under an engineer. 6873-6876. In event of war a large increase of would do, as there is a sufficient staff of engineers to supervise. 6895. Would make chief petty officers after a time, but not let them rise above that rank; should mess by themselves. 6913-6914. Knows grievances are scrubbing mess and hammocks, and the master-at-arms; principal grievance seems being turned out to wash decks, or mustering on fore-castle under the engineer during time of divisions and inspection; thinks there would be no complaint if they were mustered on engine-room platform or at appointed stations. 6915-6916. Would put stokers into mess to clean it for them, in same way as boys are put into chief petty officers' mess; leave might be arranged between chief engineer and commander without reference to master-at-arms. 6917-6918. Uniform is blue jacket with brass buttons; complain of it, as they wish to wear frock coats; thinks a longer coat quite unnecessary. 6919-6921. No difficulty about pension; are open to same consideration as other chief petty officers. 6922. Best trade to enter that which is connected strictly with engine-room and erection of machinery; blacksmith should be amongst stokers; some intelligent engine smiths are entered as engine-room artificers. 6940-6942. Has seen and heard complaints about their being inefficient; believes are not now put through any practical test in steam reserve, but at Devonport they were tried two or three days before entry; regulation that they are

not to be examined practically has allowed such a thing to creep into service. 6943-6945.

In General.—Is superintendent of H.M. dockyard at Chatham, has held position $1\frac{1}{2}$ years; before was for three years captain of the steam reserve, Devonport. 6864-6866.

SAMUEL CLEMENTS, CHIEF ENGINEER, R.N.

Engineer Students.—Aware have no means of learning practical work of an engine-room, except when sent out on trial trips, which is not sufficient. 7046. Present system of entry appears most perfect, but a little more attention might be given to practical training; knows very little of their social status; most engineers he has met have been very respectable, and majority men of refined habits, believes exceptions to be few and far between. 7059-7060. Many probably are taken from the lower stratum of society, but they are mixed, all he has known have been very respectable; if regulation they should give proof of respectability were carried out it would be sufficient. 7061. Would give nominations to those who gave proof of respectability; does not see any reason why there should not be both nomination and open competition. 7062-7067. Possible there may be in list shown him, some not fit socially to enter gun-room mess, but some are very respectable, and it would be doing majority of engineers an injustice to keep them from the position on account of the few. 7068-7069.

Engineer Officers.—Very desirable to reduce complement of in ships, and enter engine-room artificers in their place. 6961. Result, engineers being promoted at an earlier age, would be more satisfied instead discontented as at present; thinks number could be reduced if there were a sufficient number of competent engine-room artificers. 6975-6977. Advisable to put chief engineers into smaller ships, say of 150 horse-power nominal, it would expedite promotion; one chief and two engineers sufficient complement for vessels of that power. 6978-6982. Thinks pay of an inspector of machinery should be £2 per diem, and of a junior, who should be called deputy inspector, £1 15s. per diem; half-pay to be 21s. and 18s. per diem respectively, and all time from first entry should be allowed to count for retirement. 7029-7031. Suggests pay of chief engineers be progressive, as now, commencing at 15s. per diem, and increasing 2s. per diem every three years, but would abolish charge pay; after eleven years' service all time should count for increase of full, half, and retired pay. 7032-7033, 7089. Pay of chief engineers should be the same, and progressive, irrespective of duties and size of engines, but would prefer appointing experienced chiefs to large ships, juniors to smaller ones; chief engineers think it a grievance not being allowed to count all junior time. 7034-7035, 7092. Proposes engineers should commence at 8s. per diem, and increase 1s. per diem every three years; would abolish ranks of first and second class assistant; duties are very arduous and responsible, and 8s. per diem on entry would not be too much when they are competent to keep a watch; has taken into consideration are educated at Government expense. 7036-7039, 7047-7048. Supposed on entry, after leaving college, to be competent to keep a watch; are appointed in some cases to ships where there is only another, or two or three engineers; may be different now, but was so appointed himself. 7040-7042. Would not entrust watch in "Sultan" to a young engineer until he had passed through a probationary period; pay of 8s. per diem did not refer to probationary time, which might be twelve months. 7043-7045. In favour of doing away with engineers' mess when number is reduced, engineers to mess in gun-room, and after six years in ward-room; those entitled to mess in ward-room to have cabins when practicable. 7056-7058. Thinks an engineer ought to be a chief at 30, or 31 at the outside; present system of promotion by seniority is a very good one; would prefer promoting those who have passed examinations, unless in an exceptional case; is an advocate for seniority tempered by selection. 7084-7087. Junior inspector of machinery should be styled deputy, and after three years rank with a senior captain; one should be appointed to each station having an admiral in command; principal engineers in Chatham, Portsmouth, and Devonport Dockyards to be inspectors of machinery; chief engineers should rank as at present, except after ten years to rank with commanders, title, with ten years' service, to be fleet engineer. 7088. Present regulation as to chief engineers counting time is good up to eleven years, after that would allow difference to be counted; at present rate of promotion impossible to count all time, an

engineer in "Sultan" was 42 when promoted, and can never get in eleven years' service as chief engineer. 7090. Would retain limit of eleven years, provided engineers were promoted to chief engineers at 30 or 31; engineers, especially those who cannot be promoted, should be induced to retire at earlier age by giving a more liberal scale; suggests list be reduced to 500, by 8 per cent. every year, ranks of first and second assistants abolished, and places supplied by competent engine-room artificers. 7091-7094. Not desirable so much manual labour should be expected from; should superintend more, but be thoroughly competent to perform manual work, so as judge whether it was well done, or be able to do it if necessary. 7094.

Engine-Room Artificers.—Kept watch in stokehold in "Sultan" when steaming at ordinary speed, at full speed there was an engineer in each stokehold. 6962-6964. Trades in "Sultan," a fitter, an ordinary smith, an engine smith, and a coppersmith; engine smith most valuable of the blacksmiths. 6965-6968. Thinks blacksmiths should have same pay and position as fitters or boiler makers, but a very much smaller proportion should be entered, and it would be desirable to limit to engine smiths. 6969-6970. Had a few blacksmiths amongst stokers, but of no value as workmen. 6971. The four in "Sultan" very useful men indeed in their sphere; has known young engineers to be far better workmen than any fitters he ever saw in the service. 6972-6974. An intelligent artificer after three years at sea would be capable of taking charge of engines in a small ship under the superintendence of an engineer, but not desirable to place solely in charge of machinery at any time. 6983. With two engineers in a ship, engineers would only superintend, there might be occasions during day watches when they need not be in engine-room, but at night desirable one should be constantly in attendance. 6984-6986. Occasions may have occurred when artificers have been required to keep watch in engine-room, thinks are very few, has never seen himself; has given them certificates of being able to keep watch after they had been more than three years in the service, but still believes an engineer should superintend watch keeping. 6987-6988. Engine-room artificers formerly messed in "Sultan" on engine-room flat in a dark miserable place, had mess to themselves; with captain's sanction appointed a second class stoker to clean their mess, but he could be ill spared from engine-room. 6999-7002. Complained of mess place, would have put somewhere on another deck, or flat, where they could have light and ventilation; it has now been shifted opposite two scuttles on same side on same flat, and is a suitable place. 7003-7007. Engineer in charge of double-bottom compartments and pumps looked after engine-room flat deck, master-at-arms had nothing to do with cleaning of mess place. 7008-7009. Applied for leave through chief engineer to master-at-arms, and then to commanding officer, a list was given every night to the master-at-arms for his information; there was no difficulty, but they only went when ships' company were allowed leave, and with chief petty officers of corresponding rank. 7010-7015. Pay not sufficient to retain in service, suggests it should be progressive, commencing as at present and increasing 9d. every three years until they are pensioned. 7016-7018. Would like to have from both factories and private trade, would come from the latter source if sufficient inducements were held out; desirable as additional inducements for them to enter, to allow to wear a frock coat, the same as other chief petty officers of their rank, to give more consideration to messing and berthing, and should not sleep with stokers as in "Sultan." 7019-7020. If had similar mess to that now in "Sultan" on board otherships it would be sufficient, but would give better place to sleep in and apart from men; should have boy, or have someone to look after mess so as not to take away from engine-room. 7021-7024. Attendant in addition to cleaning mess and cooking meals, would have to get water ready for their washing, clean up and wash place afterwards and so forth. 7025. Stokers clean wash place themselves, engine-room artificers use same place, it is not desirable they should; does not mean that some one should clean up stokers' wash place, but artificers should have separate place, and person who cleans their mess should clean up their wash place. 7026-7028. Will be desirable men after a few years' experience; require more experience to be intrusted with watch keeping, and should then be under an engineer; suggests larger proportion of fitters than blacksmiths be entered. 7049. Thinks regulations require proof on entry of their practical abilities, and that regulations are carried out; it might be a good thing to examine, but considers indentures sufficient if from a respectable firm. 7050-7053. Has not found them fall short of what they ought to be,

are fully up to their wages, and deserve more consideration in way of messing and progressive pay. 7054-7055. With reference to their being in charge of stokehold in large ships when going at full power, and to their keeping a watch, suggests one engineer should always be on duty to supervise work everywhere. 7070-7072. Has stated has known some junior engineers to be far better workmen than engine-room artificers, but believes many of the latter are very able good workmen; speaks from experience of those in "Sultan," the only objection being that on account of their short service they had not the experience of older men. 7073. In putting patch on a cylinder in "Sultan" would rather have an engineer to assist; in repairing boilers artificers are most able, and would be the best men to get through a lot of the rougher sort work of one description in the shortest time. 7074-7075. Thinks engine-room artificers quite competent to change speed, engineer would be moving round engine-room and at hand to meet any emergency, when he left platform to go round stokehold and shaft passage would leave artificers in charge. 7076-7078. Should be increased to meet decreased number of engineers, a larger percentage of fitters entered than blacksmiths, and a sufficient number of pattern makers, moulders and coppersmiths sent to stations abroad to execute the necessary repairs in vessels. 7095.

In General.—Now on half-pay; last ship "Sultan," in her about three years and a quarter. 6950-6952. Has been a chief engineer seventeen years; brought up in service as an engineer apprentice, partly in dockyard and partly afloat; entered in 1848 as a third-class assistant engineer. 6953-6956. Half-pay is 14s. per diem; thinks has been on half-pay two years and a quarter since a chief engineer; was a little over 31 when made chief. 6957-6959. "Sultan" had nine engineers and the chief, four engine-room artificers, eleven leading and fifty-six stokers. 6960. One engineer, one stoker-mechanic, and six stokers looked after all pumps, water-tight compartments, doors, &c., out of engine-room, another engineer had charge of small engines; the six stokers were excused watch, except when at high rates of speed or hands were short. 6989-6998. Has found very great trouble in getting orders given to seamen and others out of stokehold obeyed, especially when men are sent from deck to assist in steaming, believes has sometimes reported them, but has never found them refuse to obey orders. 7079-7081. Never found seamen consider they were not amenable to his instructions. 7082. Seamen allowed 1s. a-day extra pay for working in the stokehold. 7083.

**WILLIAM EAMES, Esq., R.N., CHIEF ENGINEER,
H.M. DOCKYARD, CHATHAM.**

Engineer Students.—Thirty-three at present at Chatham dockyard; have been admitted there about five years, none left yet to enter as engineers. 7097-7099. Has no suggestion to offer as to training, except giving a little more time to practical work, should say half present school time could be given to it; not necessary then to lower standard of examination very much; would alter in higher branches of mathematics, and give more time to hydrostatics and other branches of mechanics. 7100-7114. Considers time they pass in fitting shop is usefully spent; does not know more could be well done for their practical training than at present; one leading man has general charge of all, but the leading man of each shop instructs in duties performed there. 7115-7118. Is satisfied with progress in practical training while in workshops, so far as time will admit; can scarcely keep pace with trade boys, because are removed from practical work while trade boys never are. 7119-7120. Supposes first duty of an engineer is to be able to keep watch over engines and boilers, after that to direct or take part in repairs; work of fitting shop solely would not enable a man to qualify himself for these duties without experience of seeing machinery under way. 7121-7124. Receive as much instruction with machinery under way as opportunities at Chatham allow, but not sufficient to enable them to take charge of engines on going to sea; get instruction in the construction of marine steam engines so far as opportunities admit. 7125-7128. Afternoon schooling interferes with work, during first three years attend school two afternoons a-week, would wish to see reduced to one; that ought to give them, in addition to their own exertions, as much knowledge as any engineer need have. 7129-7135. Attend drawing classes two afternoons in week during fourth year of time; should like to see more time devoted to drawing. 7136-7139. Fitting and erecting most important parts of six years' training, would not wish to see reduced, but if anything increased. 7140-7142. Would

give knowledge of design of steam engine by drawing; thinks two hours for two afternoons in the week in one year of time sufficient to learn, as far as drawing is concerned; learn construction during time employed in fitting and erecting shop and on ships undergoing repair; leading men, some of whom are well versed in practical construction of marine engines, would teach in fitting shop. 7143-7152. Thinks an engineer should be better educated than an engine-room artificer; as regards whether one day a-week when a student would enable him to acquire that education assumes he would exert himself in his own time to fit himself for his future position. 7157-7160, 7168. All he recommends examination should be lowered for would be for purpose of affording more practical knowledge to students, but educational acquirements lost in that way should be made up by themselves if necessary. 7161, 7169-7170. Practical study satisfactory; only improvement could suggest in mode of practical training would be to give students greater opportunities of seeing machinery under way; certainly desirable they should know something of engine design and construction, have the opportunity of learning to a limited extent. 7171-7174. Social class they are taken from varies very much, thinks there is no limit; those at Chatham come chiefly from neighbourhood, and live at home; there are some from the vicinity of Portsmouth and Devonport; they generally live in lodgings with some of the workmen. 7199-7203. Does not like open competition; would rather see nomination by Admiralty, and competition afterwards, is quite sure it would cause a better social class to enter. 7204-7207. Some improvement might be made in dockyard about their taking up tickets; no place at present at Chatham for washing in and changing dress, but will have, thinks it very desirable; should be treated differently from time of entry in dockyard, and not in same way as trade boys and workmen. 7208-7210. Different treatment a necessity if it be wished to get in a better class; by nomination in all probability sons of officers will be got to enter, now are nearly excluded. 7211. Examination for entry is rather stiff, would certainly not make it higher; no idea where they are generally educated before going into dockyard, nor that there are preparatory schools for them; Chatham is not well off as regards schools. 7212-7215. Considers marks should be given for skill as mechanics, not aware were not given for practical examination. 7222. Engine-room artificers as a rule better workmen, but some students have been very proficient; a man brought up to one particular class of work better able to do it, than a man who spends part of time at each kind done in dockyard. 7223. Thinks students at Chatham could turn work by hand like specimens shown him, it is pretty well done, but there is nothing wonderful about it; after five or six years a young man ought to be able to do work like it, if he attends to the training he receives. 7287-7290.

Engineer Officers.—In favour of appointing to a ship more engine-room artificers and fewer engineers, would afford promotion to and improve position of latter; beneficial also to have former where extensive repairs have to be executed, as it cannot be expected engineers should be as good workmen at any particular trade as men kept at one trade during lifetime. 7153-7156. Thinks if entry were thrown open to engineering world, men would be found able to pass examinations engineer students have to pass before entry into service; alludes to modified examination as he would make it. 7161-7163, 7221. Desirable to have well educated men as engineers whatever number of artificers is introduced; education would enable them to take position as officers, and direct work to machinery of a ship, including gun carriages, slides, &c. 7164-7167. Considers present educational requirements are placed unnecessarily high; cannot say it keeps out young men it would be for benefit of service to enter. 7219-7220. Would rather not give assistant engineer on entry charge of a watch, he cannot be considered a professional engineer for watch keeping; thinks ought to be, and suggests as a remedy giving experience in seeing engines under way. 7224-7227. Not satisfied with present pay of engineers, should increase according to years served. 7228-7229. For benefit of service an engineer ought to be made a chief engineer about 30; was a first engineer, old scale, at 25, but joined service in 1844 with that rank. 7230-7232. Counts about 30 or 31 years' time, all but that on half-pay. 7233-7235. Does not consider relative rate of pay of an assistant engineer and an engineer is just and equitable, the former on entry at age of 21 receives 6s. a-day, the latter 21 years after 10s. a-day; thinks pay on entry, taking into consideration man has received education from Government for nothing, ought to be 7s. a-day. 7236-7237, 7268-7270. If list

were reduced and engine-room artificers substituted, in case of war additional engineers required would have to be obtained from private trade or mercantile marine; if offered inducements a sufficient number would come forward for temporary service. 7255-7258. Was chief engineer of "Inflexible" during Crimean war; had no experience of temporary service men, but heard many complaints of their non-efficiency; would be some difficulty, again no doubt if number of men were entered from country at large on an emergency, but sees no other source to obtain from except mercantile marine, or private trade. 7259-7262. Having in view efficiency of service, thinks promotion to chief engineer and pay of engineers generally should be looked to. 7263. Pay should be increased in proportion to service; engineers are the lowest paid class of officers; a great anomaly about rank of chief inspector of machinery, no difference between pay and that of an inspector, believes only pecuniary benefit derived from promotion to former rank is increased pension to widow; pay of an inspector much too low, a chief engineer can receive more. 7264. Proposes pay of chief inspectors of machinery on promotion should be £2 a-day, and 1s. a-day for each year served, until a maximum of £2 6s. is reached; inspectors on promotion £1 10s. a-day, and 1s. a-day for each year served, to a maximum of £2; chief engineers, under five years' service, 15s. a-day, 1s. a-day additional for each year served until maximum of 25s. is reached; engineers under five years, 11s. a-day, under eight, 12s. 6d., under twelve, 14s. a-day. 7266. Would like to see rank of second class assistant abolished, classification to be chief inspectors, inspectors of machinery, chief engineers, engineers and assistant engineers. 7267. Considers all ships commanded by a commander should carry a chief engineer, would afford means of promoting more engineers. 7270-7272. Thinks pay given to engineers from private trade and mercantile marine during Crimean war went up to 15s. and 16s. a-day; believes were paid more than chief engineer of ship in which they served; would not like it to be done again, but you cannot have a staff of trained engineers for an emergency, and does not see where they are to be obtained otherwise than from mercantile marine or private trade; in case of war now there would be a larger supply to draw from, and certificates they have to obtain from Board of Trade would ensure getting a better class. 7273-7276. Rather inclined to think it would be better to "retire" engineers than to "pension" them; would not be any good to give step in rank on retirement, except to help to obtain employment elsewhere. 7281-7282. Would be better to promote portion of engineers to chief engineers, and chief engineers to inspectors, by selection. 7283-7284. Better to give engineers higher pay instead of charge money, appointing as near as can be to ships of different classes for which pay would make them appear suitable on account of service and experience; system of charge pay no doubt enables an active young man to be taken for an important charge and rewarded accordingly. 7285-7286. Considering duties and various fittings of a ship now under charge of the engineers, thinks should belong to the military instead of the civil branch, without at all looking forward to command of the ship; necessary also they should have a knowledge of the construction of gun carriages, guns and turrets, and of gunnery. 7290-7294.

Engine-Room Artificers.—Has occasionally attended examination of; a practical one principally as to names and uses of the different appliances of the engines and boilers. 7175-7177. Men entering as coppermiths or fitters, are examined after entry by officers of the steam reserve to ascertain they really know their trades; if entering from dockyard their certificates are received, if from private trade bring certificates from places at which they have been employed. 7178-7183. Has not had under him, but men who have left dockyard to enter as have been good average workmen. 7184. Pay offered not sufficient to induce good men to enter, would not get under 6s. a-day; majority do not consider other advantages there are besides pay; 5s. 6d. a-day and increase of 9d. a-day for every three years' service might induce good men to enter. 7185-7191. Trades wanted chiefly in the navy, engine fitters, boilermakers, coppermiths, and enginesmiths. 7192-7198. Are entered by steam reserve, but takes part himself in their examination. 7217-7218. Causes of discontent have not come under notice officially, but has heard talked about; grievances in some cases valid, position on board ship and menial duties they have to perform, cleaning messes, &c., such that better class of artificers will not enter, or at any rate care to remain. 7238-7246. Should not object to seeing an artificer have charge of stokehold if satisfied he was capable; thinks

many that ought to be obtained for fair wages would be capable of taking charge under the direction of the engineer in charge of the watch. 7247-7249. Not aware of any difficulties having arisen in consequence of an artificer being in charge of the engine-room in a small ship; might properly be left in charge, engineer is close to engine-room, and can be called at any time. 7250-7252. Prospect of pension not so much influence on an artificer on entry as present rate of pay. 7253-7254. Necessary in a fleet to have coppermiths; half a dozen sufficient in a fleet like the Mediterranean. 7277-7278. Trades should recommend to be entered, boilermakers and fitters, a larger number of the former, because when boilers become old a considerable staff would be wanted to execute repairs. 7279-7280. Considerations should be obtained, if possible, from workmen trained, or for some time employed in a royal dockyard; after two years' probation be made chief petty officers; treatment on board ship to be somewhat in keeping with social position as skilled mechanics and arrangements made to relieve them of menial offices; pay should be 5s. 6d. a-day on appointment, 6s. after two years, and 7s. a-day after eight years' service. 7294.

CHAS. W. G. CHAMBERS, Esq., CHIEF ENGINEER, R.N.

Engineer Students.—Not aware of classes of society from which a large portion come; thinks though no limit is placed on their social position, could be put into gun-room mess when they join the service as engineer officers, if not, ought not to be put into position they hold. 7330-7335. Should be admitted from any class of society if competent to pass the examination; conduct should be tested as well, but sees the difficulty of doing it. 7339-7342. Thinks are a little deficient in practical training; but has not sufficient experience to speak positively. 7369. With reference to class admitted by open competition, does not say it is a good thing for dockyard labourers' sons to go into mess with a social class they have not been accustomed to, but an assistant engineer on entry ought to receive the advantages of the position in which he is placed. 7394-7396. Not sufficiently acquainted with all considerations to say whether open competition should remain without modification; the only alteration he can suggest is to raise standard of examination, thinks very few labourers' sons could pass present examination. 7398. Did not know a poor professional man could not afford to educate his son in same way as a boy could be educated at a Board School. 7399-7400.

Engineer Officers.—Nearly 18 years in service, age 38; was promoted by seniority, but had 12 months' time for 1st class certificate; considers is under average age at which men are now promoted. 7313-7316. On leave and receiving full-pay of late rank 10s. a-day; when leave expires will go on half-pay as a chief engineer, 6s. a-day. 7317-7320. Expected when he entered service to be made a chief engineer in about ten years, promotion since has become much slower. 7321-7322. Flow of promotion not satisfactory, would tend to improve if a larger number of engineers were made chief engineers and put into smaller vessels than at present, and if elder engineers were allowed to retire at an earlier age; thinks many engineers over 35 would retire if allowed. 7323-7327. Suggests ranks of first and second assistants be abolished, officers holding the ranks to be made engineers and assistant engineers, the latter to go into gun-room, and on becoming engineers into ward-room. 7328-7329, 7386-7393. Engineer messes in which he has been have been decently regulated and well conducted; it is not that they are not comfortable, but an engineer feels he is differently treated through messing apart from other commissioned officers. 7336-7333. As regards preference in giving a job of work to a young engineer just joined, or to an engine-room artificer, the latter would have had more practical experience. 7370. Thinks if a young engineer is in stokehold before he has charge of engines, it is sufficient training, but he should gain experience under an engineer before being put in charge. 7371-7372. Pay on entry is satisfactory, but older engineers should progress up to 12s. a-day. 7373-7375. Passed theoretical examination for chief engineer in 1864, taking a first-class certificate, for which has just received twelve months' time, and practical examination in 1865; was between 27 and 28 years of age at time of passing. 7376-7380. Would rather see engineers promoted by seniority than selection; should not have been promoted for another year himself had it not been for his first-class certificate, thinks class of certificate received ought to have an effect on a man's promotion. 7381-7383. No idea how long shall be on half-pay; some chief engineers are twelve months on. 7384.

Engine-room Artificers.—Had three in "Bellerophon," but complement was two; trades, fitter, boiler-maker and coppersmith, all competent men; coppersmith was discharged for insubordination. 7301-7307, 7312. Boiler-maker had very little work to do to boilers, when not employed at his own trade made alterations and repairs to ladders, floor plates, &c., and repaired tools; others employed in own trades only; boiler-maker the only smith, others could repair their tools. 7308-7311. Kept watch in stokehold; did not receive a certificate from captain or chief engineer, relative to their qualifications for keeping watch in the engine-room. 7343-7344. Did work on board other ships in squadron, and received extra pay for it. 7345-7346. In some small ships on station kept watch in engine-room; believes performed duties satisfactorily. 7347-7348. Thinks pay should be increased before they have completed their ten years' service; more chance then of keeping in service. 7349-7351. Accommodation in "Bellerophon" wretched; for mess three had small table and stool close to foremast, with chain cable at back. 7352-7353. Messed by themselves; at first had a boy to mess with them to clean mess, but his duties prevented his attending properly; stoker messed with afterwards, were then more comfortable; before always in trouble about mess being dirty. 7354-7356. Not more satisfied at end of two years than they were at the beginning; frequently had to go without meals for some time, as man who was supposed to wait on them had to attend to his own duties. 7357. No very comfortable place for them to mess in in "Bellerophon," she was so crowded; too hot on engine-room flat, no room there if better ventilated, nor on main deck where men messed. 7358-7366. Mess could not be much improved except by their messing with the other chief petty officers; believes they did originally, but captain shifted them on account of the coppersmith being so disagreeable. 7367-7368. Thinks would be satisfied with a moderate increase of pay and an improvement in messing arrangements, the latter a great grievance. 7401-7402. Not put upon on lower deck unless of disagreeable character; when there is quarrelling, fault generally on both sides; not prepared to rough it so much as other chief petty officers, on account of different habits before entering service. 7403-7406. As chief engineer of a small ship, should want to look after an ordinary engine-room artificer when in charge of engines. 7407. Thinks those he has been shipmates with will re-engage after ten years, if their accommodation be improved, and that the pension has value in their eyes. 7408-7409.

In General.—Promoted 1875, last ship "Bellerophon," in her four years; was senior engineer; she had originally seven engineers, but latterly six in addition to the chief engineer. 7296-7300.

**JAMES PATERSON, Esq., R.N., CHIEF ENGINEER,
H.M. DOCKYARD, SHEERNESS.**

Engineer Students.—About 30 at Sheerness; examined on completion of their time, are very fair workmen, but not what would be called first class. 7414-7416. Trade boys in fitters' shops at end of six years are, as workmen, a little better than the students, but both are good. 7417. Regulations issued two years ago placing students under care of a leading man have had a beneficial effect; half yearly reports are forwarded, showing proficiency in practical studies; they are not examined in practical work until the completion of their time, but work is carefully inspected. 7418-7420. No limit to means of instructing, can be put to any work in the shops; considers fairly earn pay; if given a piece of work are more time over it than you would expect a good workmen to be. 7421-7422. Could not recommend any improvement in training. 7423-7424. One leading man looks after the 30 students; he has no other duty; is a leading man of fitters, and receives 8s. 6d. a-day; he has been at Sheerness a long time, but does not know where he was before. 7425-7430. Thinks advantage would not equal cost if there were three or four men put in charge of students to watch over their practical work, all the leading men in the different shops look after them and there would not be work enough for more men; in boiler shop are more directly under foreman boilermaker, but leading man who has special charge of them sees how they are getting on. 7431-7432. Foreman boilermaker, and foreman moulder not paid for instructing students, would take more interest in if they were; does not think foremen of the shops pay more attention to trade boys than to students. 7433-7436. Students when examined in practical work on leaving dockyard are classified in the terms, "Very creditable," "creditabile," and "ordinary."

7437-7439. Very little trouble in getting to attend to work; has had to find fault with for inattention, and occasionally for carelessness; keep very good time, may perhaps be a day or two away without leave. 7440-7442. If absent without leave are admonished; if more than two days away are brought before the superintendent, this is very seldom; pay stopped for the two days, is also stopped if on leave; another means of punishing is stopping their next rise of pay until they are thought deserving. 7443-7445. Are instructed in drawing for about three or four months continuously in their fourth year of training. 7446-7448. Believes candidates for studentships have only to make an application to the superintendent, anybody can put down name in whatever class of life; does not think it a very satisfactory plan, suggests they should be nominated, and it would be very advisable to inquire into antecedents. 7449-7454. If entered from a better class in society has no modifications in their treatment in dockyard to suggest, might have a place for washing, and a little more care might be taken about their personal appearance; unadvisable for them not to take up tickets, but signing book would answer the same purpose. 7455-7457. Leave off work at six in Summer time; have to be in school at seven; there is a place for them to get tea, wash and dress, a few avail themselves of it; others go out and come in again as quickly as they can. 7458-7461. Have to make up time they lose, it is a punishment, but not severe. 7594-7595.

Engineer Officers.—Promotion not very satisfactory; it is so slow. 7484. Two in "Agincourt," who had just joined service, were put in charge of the engines; thought competent to take charge; obtained their knowledge in "Agincourt"; had been in a tug for a little time before; they did very well. 7497-7501. Young engineers as a general rule not in charge of engine-room actually keeping watch; were in the stokehold, engineers of more experience being in the engine-room. 7502-7503. Preference between a young engineer and an engine-room artificer, as part complement of the engine-room, would depend on experience of each; not knowing sort of man he was going to get, should prefer a young engineer on account of his superior education, which is valuable and makes a man more reliable. 7504-7508. To remedy stagnation of promotion, if enough good artificers could be obtained, engineer list might be cleared in same way as the lieutenants and commanders, by offering additional inducements for retirement; this would be the quickest way; another way would be to enter fewer students, or gradually reduce number of engineers and enter more artificers. 7509. Engineers ought to be promoted to chief engineers between the ages of 30 and 33; very desirable chief engineers should be in all ships commanded by a commander; would give a greater number employment, and expedite promotion. 7510-7512. Thinks an inspector of machinery is very much underpaid; ought to have at least 30s. a-day, increasing 1s. a-day for each year's service; would give a chief inspector £2 a-day, rising to £2 6s. a-day. 7533-7536. Chief engineers should commence at 15s. a-day, and rise to 25s. a-day; seniors will generally have 3s. a-day charge money, which is advisable 7537-7539. Engineers ought to go to 14s. a-day, rising from 9s. by 1s. a-day, every three years. 7540-7541. Assistant engineers to commence at 7s. a-day, instead of 6s., takes into consideration their having been educated free of expense and paid during the time. 7542-7545. Messing very unsatisfactory; suggests assistant engineers on entry should mess in gun-room, after five or six years, when engineers, in ward-room; number being much reduced, engineers' mess berth could be done away with 7546-7548. Retirement of engineers might be improved; his own would be £420 a-year, after 28 years' service, counts all time, having entered as a second assistant; thinks engineers should have 9d. a-day for each year served, and chief engineers 1s., but has not studied matter much. 7562-7567. In case of war should have to look to private firms for engineers, and a number of workmen in dockyards would join as engine-room artificers; would enter temporarily for special service, discharging them, if their services were not required, after the necessity for their retention ceased; would give large present pay, but no pension. 7584-7589. Universal wish of service engineers' mess should be done away with; is a cause of great dissatisfaction, as engineers are not acknowledged as officers, only gun and ward-room messes looked on as containing officers. 7590-7591. Engineers not being acknowledged as officers, to be accounted for by their being isolated and placed in mess of their own, they do not, or are not allowed to associate with the other officers; thinks are quite fit to associate with officers of the gun and ward-room messes, as they are educated quite as well; there are some who

are not altogether what could be wished, but if they did not conduct themselves they would be very soon weeded out. 7592-7593.

Engine-Room Artificers.—Used to examine when steam reserve was at Sheerness; are now examined and entered at Chatham. 7461-7463. When entered at Sheerness a number came from the dockyard, some passed, others did not; those who came from the private trade were examined in accordance with the regulations; were tried in floating factory, thinks given work to do before entry. 7464-7467. Ought to be examined as to practical ability as workmen at their own trade; did not as a rule so examine them, it was left to the inspector of machinery in the floating factory. 7468-7469. Are well qualified as a rule, but do not get the best men, would have to pay rather higher for them. 7470-7471. Pay is now 5s. a-day on entry, and 7s. 9d. after three years, if thoroughly satisfactory men were wanted, in considerable numbers, it might be 5s. 6d. a-day on entry, increasing 6d. a-day every three years to 7s. 6d. 7472-7474, 7476. Bears in mind are paid for seven days in week, get provisions, pay when sick, certain employment and pension at end of twenty years; but men look on going to sea as a disadvantage and consider they must be well paid for it. 7475. About three or four blacksmiths entered as engine-room artificers at Sheerness; there are no engine-smiths in factory; blacksmiths in dockyard get 36s. or 38s. a-week, about the same as engine-smiths, some go as high as over £2 2s. a-week. 7477-7481. Blacksmith not so useful afloat as engine-smith, the latter always a better blacksmith than man brought up in shipwright's smithery; a number of the boiler-makers are very good smiths. 7482-7483. Never had experience of artificers keeping watch in engine-room of small vessels at sea, but believes they do. 7493-7494. To conduct a job of work would rather depend on a young engineer just joined than an artificer; considers present class of artificers is not composed of the best workmen, although some are very good. 7495-7496. Not heard any special reason given by factory workmen for not entering as; they like to be with their families and do not care to go to sea. 7513. In "Agin-court" artificers had a mess forward on mess deck by themselves; complained at having to scrub mess out. 7514-7517. Did work satisfactorily; two, the blacksmith and fitter, were very good, the third, a "nondescript," who had been a stoker mechanic and knew a little of each sort of work, was both useful and careful and kept a very good watch. 7518-7520. Thinks it would be advisable to let engine-room artificers have good conduct badges, with pay. 7521. In "Agin-court" mustered at evening quarters by themselves, at the end of the line of men, and were inspected by one of the engineers. 7522-7524. One of the engineers mustered for inspection at divisions and reported to the lieutenant or the commander, they were in the lieutenant's division, although their bags and clothes were mustered by an engineer and reported to the lieutenant; was responsible as chief engineer for the inspection, but an engineer did the duty. 7525-7529. Ought to have a mess of their own, but is regarding as a superior class to those now in service; should have mess place engineers have at present. 7548-7549. Would only give rank of first class petty officers; reason for giving better mess place than first class petty officers, because a good mechanic would not go into a mess on the lower deck, and scrub and clean it. 7550-7551. Does not know who would clean mess if exempted from scrubbing; scrubbed mess out themselves in "Agin-court" and did not object, but looks on engine-room artificers of the future as a superior class. 7553-7554. Thinks by giving 5s. 6d. to 7s. 6d. a-day, artificers would come from a better class and be better workmen, good workmen do not like to come into service for low pay given at present. 7555-7556. Should have similar uniform to first class petty officers; would give them a frock coat, could put it on Sunday or when on leave, but not in engine-room, would wear jacket there. 7557-7558. Obtained leave in "Agin-court" from commander, after going to chief engineer to see whether they could be spared, thinks told master-at-arms. 7559-7561. No objection, if chief engineer of a ship like "Danæ," to seeing an artificer in charge of the engine-room, if a steady man; taken as a body are very fair for their class and may keep watch very well. 7569-7570. Believes some armourers and blacksmiths have been entered as; when grade was first established, a handy man, not a good workman, was made an artificer, it is not a good thing, ought to be fitters and boiler-makers, thoroughly qualified men who have served a proper apprenticeship. 7571-7574. Putting into engineers' mess would not remove too far from what they are required to be, working artificers; just as well to make mess place for, because if substituted for engineers they would require as large a mess berth as engineers have now. 7575-7576.

Large mess berth would entail a servant and cook, or ship's cook might do, men could not prepare dinners as artificers do at present; unless given a comfortable place only indifferent men would be obtained, good mechanics would not put up with common mess place. 7577-7579. Should not become warrant officers. 7580. Prospect of pension a greater inducement to remain in service than present pay; half after ten years' service might go. 7581-7582. Position should be open both to men brought up in dockyards and in the private trade and large factories; trade boys in government factories would make very good engine-room artificers. 7583.

In General.—Has been three years chief engineer of Sheerness dockyard; was for twelve months before assistant inspector of machinery at Chatham dockyard; last at sea in "Agin-court." 7410-7413. Had in "Agin-court" seven engineers and three engine-room artificers; joined her as chief engineer 1864, at Birkenhead, before she was finished; she was commissioned in 1867 or 1868; all the engineers and engine-room artificers she had were required. 7485-7492. Thinks stokers in engine-room department should be solely under the chief engineer; engineer responsible for list of their clothes, and they are in his division as it were, although he has not a division of his own; does not see why the lieutenant should have anything to do with it, nor any reason an engineer should not do the duty under the chief engineer. 7530-7532.

WILLIAM MACAULAY, Esq.

Is one of the managers of the Peninsular and Oriental Steam Navigation Company; has a general supervision of every department. 7596-7597. Generally have a large list of applicants for entry as engineers; all are taken in as junior engineers and work up in the service, there are six classes. 7599-7600. Three-fourths of the engineers in their service are Scotchmen, come from marine engine factories on the Clyde, and at other ship building ports in Scotland. 7601-7603. Number of engineers at present in the Company's service—forty-nine chief engineers, forty-two second engineers, forty-six third engineers, forty-two fourth engineers, forty-two fifth engineers, twenty-six boiler-makers, and eighteen winchmen. 7604. Boiler-maker never rises to be an engineer; winchmen are not practical engineers, nor always engine-smiths, are sometimes boiler-makers, but not necessarily. 7605-7607. All mentioned have served their time at a trade, except the winchmen, and are on pay. 7608-7611. Winchmen receive £72 per annum; boiler-makers £132, after three years £138; fifth and sixth engineers the same, £120; fourth engineers, £138; third engineers, £150; second engineers, £180; chief engineers £250, after three years £275, after seven £300, and after ten years £350 per annum. 7612. As regards pension, or gratuity on retirement, each case is considered, an old servant might be given either a small pension or a sum of money, the latter the most usual; a few men have a small pension, but as a rule there is no pension list. 7613-7616. Before the opening of the Suez Canal engineers were engaged for three years under certain conditions; the conditions are not used now, except on the Australian or local Indian lines, engineers are simply on ship's articles for six months; they are obliged to give six months' notice, the Company three, but can be dismissed immediately for misconduct, drunkenness, breach of discipline, or anything of that sort. 7617-7618. Fifth and sixth engineers receive £120 a-year on entry, in addition are provided with provisions, mess and food; they wear a uniform, but boiler-makers and winchmen do not. 7619-7622. Superintending engineer examines for admission in London; formerly Southampton was the engineering head-quarters and principal dépôt, ships now always come to the Victoria Docks. 7623-7625. Have no printed regulations of the qualifications engineers are required to possess on entry; are called on to produce certificates of character and qualifications, and then are examined as to abilities in practical work by the superintending engineer. 7626-7627. Not called on for any special educational qualifications outside their profession; are required to have a knowledge of reading and writing, and most of them are very good draughtsmen; preference is given to men having these qualifications. 7628-7629. Promoted according to merit and seniority combined; a man is not promoted because he is next senior, if there be one below considered better qualified he would be promoted in preference. 7630. Sometimes a long while before reaching rank of chief engineer; promotion very uncertain, occasionally rapid, at other times rather stagnant. 7631. Oldest chief engineer in the Company's service is 67, to youngest 35, younger men have been promoted, but when

seldom have a chief engineer under 30; second engineers, oldest 54, youngest 26; third engineers, oldest 62, youngest 24; fourth engineers, oldest 33, youngest 24; fifth engineers, oldest 33, youngest 22; boiler-makers, oldest 45, youngest 24; there are six classes of engineers, but fifth and sixth are paid the same. 7634-7636. Have no other artificers in engine-room department besides the engineers and boiler-makers; engineers do all work connected with the machinery. 7637-7640. Boiler-makers generally remain in service a very long time, man who is 45 may have been fifteen or sixteen years; are not employed on shore in England, always kept afloat in ships, other boiler-makers and engineers being employed in Company's factories in the East; if a sea-going man in the East be sick, he is put into the factory on shore. 7641-7644. "Khedive" the largest ship, 600 horse-power nominal 2,695 actual, has five engineers, including the chief and a boiler-maker. 7645-7647. Chief engineer not called on to keep any special watch; is the only engineer officer that in the navy would be called a quarter-deck officer, he is entitled to go into the saloon for his meals and to appear on the quarter-deck, others only allowed there at invitation of the captain; watches are divided into four hours each; second engineer keeps four to eight watch with a Serang; the third engineer and boiler-maker keep the eight to twelve; have no European firemen, all are natives of India and Africa, termed "Seedy" boys. 7648-7651. Boiler-maker repairs boilers, and is made generally useful in connection with working of the machinery, assisting the engineer in charge of the engines and boilers. 7652-7653. Third engineer may be in any watch, but as a rule keeps the eight to twelve, the twelve to four being kept by the fourth and fifth engineers, and four to eight in the morning by the second engineer; in fact engineers are in three watches. 7654-7656. "Khedive" has one boiler-maker. 7657. Each engineer keeps a log-slate, and chief engineer is responsible for the log generally. 7658. Boiler-maker messes in the junior engineers' mess, there being, as a rule, a separate mess for the engineers; mess is provided entirely by the Company both for the engineers, boiler-makers and winchmen. 7659-7661. A great many repairs done on board, engineers are expected to do bulk of wherever ship may be; if large repairs are required to engines, Thames Ironworks Company are employed. 7662-7665. Chief engineer is supposed to see his people keep their mess-room in order, not laid down as one of his duties, but captain sees to it; chief engineer is entirely under control of the captain; second officer of the ship has nothing to do with cleanliness of engine-room, chief engineer is solely responsible. 7666-7669. Chief engineer is held responsible for cocks, valves, auxiliary engines, winches, &c.; engineer of each watch is responsible under him. 7670-7672. Have steam-steering gear in some ships, steam capstans in nearly all; tried hydraulic gear once in the "Mooltan" twenty years ago and it failed. 7673-7675. Contract with various people for making engines; for ships built in the Clyde, builder generally makes, have never been confined to one maker. 7676-7677. Engineers receive same pay whether in harbour or at sea, and mess in same manner; mess is always kept going. 7678-7680. Thinks a young engineer entering their service has a fair prospect of becoming a chief engineer if he behaves and is intelligent. 7681. Engineers do not pass a formal examination; superintending engineer asks such practical questions as he thinks proper, and if satisfied they are allowed to enter. 7682-7684. Second engineer has a cabin, he is not allowed a servant, one is allowed to the engineers' mess; cooking is done in ships' galley, mess being the same as the second class passengers. 7685-7688. Chief engineer has no perquisites or allowances; does not understand the term "charge money," chief engineers have nothing beside their pay, which is the same in India and elsewhere. 7689-7691. During tea season all ships come home from China to London. 7692. Four or five appointments as superintending engineers, or assistant superintending engineers, to which chief engineers of long service are appointed; superintending engineer at home has £700 a-year; salaries are higher in India. 7693-7695. Fancies most of their engineers have a theoretical education; Scotch engineers are very well educated in their profession, but education is more practical than theoretical. 7696. Would not take a man who did not understand practically what he might be called on to do, nor one who had been educated for six years in a factory, and never had any practical education in working the steam-engine. 7697-7698. Juniors are taken from factories, but are only placed as fifth or sixth engineers; all men taken have driven marine engines, have seen them in the factories, and fitted up before being put into the ship. 7699-7700. Should not give a young engineer who had never driven a steam-engine charge of a watch; would take him as sixth

engineer if he had a practical knowledge of the marine steam-engine, certainly if he had served his time in a factory. 7701-7704. Examination by the superintending engineer would not be called a crucial one in the navy, it is more according to certificates a man brings; if a man were found not to be likely, he could be got rid of in six months, but does not know of any young man being discharged for incompetency. 7705-7707. Have plenty of applications, sometimes engineers are obtained from factories where the engines are made; are generally young men. 7708-7710. "Khedive" carries as engine-room crew six Europeans and forty-three natives, five engineers and a boiler-maker, Europeans; one Serang, two Tindels, three Paniwallahs, one native storekeeper, one lamp man, one Bandarry, who is cook for the natives, one engineers' servant, one trimmer Serang, eighteen firemen, and fourteen trimmers; pay ranges from £3 13s. to £1 5s. a-month; they say they have a caste, but it is not recognised. 7710-7712. Average age of an engineer on becoming a chief engineer from 30 to 35; no fixed age for a chief engineer leaving the service, it depends on the individual, one man at 60 may be quite as strong as another at 50; 60 might practically be said to be the limit, though one in their service is 67. 7714-7716. All ships, including "Khedive," go up to Calcutta. 7717. Could not say proportion of deaths amongst the engineers, but it is not great. 7718. Company's ships all built in compartments, they are entirely under the chief engineer, who is responsible to the captain for them; captain and chief officers are required to satisfy themselves frequently that the cocks, pipes, valves, sluices, &c., are in order, and not merely take the word of the engineer. 7719.

JOHN BOWERS, Esq.

Is superintending engineer at Southampton for Royal Mail Steam Packet Company; has served at sea as an engineer. 7720-7721. Engineers in the Company's service are entered young (about 24 or 25), and serve up for promotion; come from factory establishment, where they are first entered as required from list of applicants, who are men who have served their time in various parts of the kingdom. 7722-7726. Takes a very limited number of boys as apprentices in factory, they become engineers; one manager for Sir J. Rennie, others have risen to be chief engineers in Company's service; generally hold good positions, as a rule are a better class of boys. 7727-7729. Men obtained from different firms have generally served time as fitters, and gone through the different shops; prefer a man who probably has had two years' pattern making, two fitting, and last year erecting. 7730-7731. Have a special grade of boiler-makers in their service, one in each ship; rank with, but under engineers, and mess with junior engineers; keep watch with engineers, but always attend to boilers; never rise in rank. 7732-7736. Grades in Company's service—chief engineer, first, second, third, fourth, fifth, and sixth engineer, and boiler-maker; pay of chief engineers £22 a-month in Transatlantic ships, £24 in intercolonial; may rise to some appointment on shore, but there is no rank beyond, and only one other shore appointment as resident engineer in the West Indies, and one as his assistant at Southampton. 7737-7740. Men have retired from service as chief engineers; one retired on account of old age; thinks did not ask for anything, had he, would probably have received a gratuity, but no pension; Company insist on every engineer insuring life; each grade receives gratuity not exceeding £50; highest amount for an engineer would be £40; about half the insurance is paid by Company; it is partly a condition of engagement, and is stopped out of men's pay. 7741-7764. Next engineer after the chief receives £12 a-month, after seven years £14 a-month, next £10, next £9, next £8, last two juniors; boiler-makers, inter-colonial, £9 a-month; Transatlantic, £7 10s.; are found with everything—bed, bedding, and provisions; receive equal to 2s. 6d. a-day wine money; are allowed to have either half-a-pint of brandy and a bottle of malt liquor, or a pint of wine and a bottle of malt liquor; draw 1s. 10d. if they do not want any. 7747-7752-7754. Draw the 1s. 10d. everywhere, except in Southampton; there they go on shore pay, which is sea pay with 14s. a-week added, and lodging money. 7752-7753. Have no mess in harbour in Southampton, are on shore pay. 7755-7756. Indicated horse-power of largest class of ship nearly 4,000; she would have one chief, five engineers, a boiler-maker and three men as general assistants called greasers. 7757-7758. Greasers are a better class of firemen, and men who can be depended on; not trained mechanics, simply leading stokers, there is one in each watch; would not be able to drive an engine on an emergency, have only to lighten

labours of engineer of the watch, and do other duties put to. 7759-7762. One engineer has special charge of stokehold, and a portion of the engines, when not too far apart, but he is under a senior engineer. 7763-7764. Engineers in three watches at sea, four hours on, eight off; chief engineer keeps engine-room register, and is responsible for it, captain signs it every day. 7765-7768. No other artificers or mechanics in engine-room besides those mentioned; engineers do all the mechanical work. 7769-7770. Have a small place called a factory at St. Thomas's; could not attempt to refit a ship in West Indies, but if a shaft required changing, it could be done at St. Thomas's, where spare shafts are kept. 7771-7775. Require men taken as engineers to have sufficient education, or to be able to instruct themselves sufficiently to pass Board of Trade examination, which is compulsory; their engineers pass quite as high an educational examination as is necessary, but great test is mechanical; man who suits their purpose best is a thoroughly practical mechanical one, who can pass Board of Trade examination. 7776-7777. Compound engines in nearly all their ships; no more difficulty in handling, but may require a little more sharp judgment; have surface condensers. 7778-7780. Junior engineers have separate mess, called second engineers' mess-room; second engineer and second officer have mess separate, but generally near each other; junior officers and engineers do not mess together, as the latter arrange their mess differently, on account of watches and their being compelled to have two or three separate meals, they not being allowed to leave engine-room while on watch for any meal. 7781-7782. Engineers do not keep four to eight watch in evenings right home from West Indies, but one against the other, and so jealously, they will contest to whom a revolution belongs; everyone keeps log of his own revolutions and coals expended. 7783. Nothing as reward or punishment to encourage zeal, but promotion, which is regulated by proficiency and good conduct. 7784-7785. Promotion not by seniority; all things being equal it might be, but pick from best men; judges of merit himself from reports received from captains and chief engineers every voyage. 7786-7790. Thinks as regards promotion by seniority or selection, engineers would sooner have it as it is; if two engineers were equal, would promote the senior. 7791. If a man committed himself seriously would try him by an inquiry if case were beyond own control, which is seldom, calling him before captain and chief engineer of the ship; would deal with ordinary case himself, if one of dismissal would give man letter showing cause, this being subject to approval of the Directors. 7792. Coal-trimmers and stokers a different class from others; firemen made from the former, and have £4 5s. a-month, coal-trimmers receiving £2 15s. a-month; firemen nearly all English, and have in addition to pay 5s. a-month for grog if they do not drink it. 7793-7795. Generally, engineers would be capable of doing any coppersmith's work required on board ship; system in factory is to put half-a-dozen young men to work indiscriminately, ordering certain work to be turned out, and if they proved to be not efficient, their services would be dispensed with, none being placed on sea-going books unless professed mechanics of good ability. 7796-7797. Class of boiler-maker taken, called boiler-smith; a man accustomed to set angle iron and dress tools, but able to do caulking or patching and boilersmith's work. 7798-7800. No difficulty in getting engineers; now thirty applicants, of whom about ten per cent. would be inefficient. 7801-7802. No ceremony made about rejecting a man; if an engineer after his first voyage is not found suitable he is discharged; engineers not bound for any time are free to go at end of voyage, and can be dismissed. 7803-7804. Never been compelled to get rid of a chief engineer on account of age; two or three have resigned through getting old; oldest engineer about 58. 7805. Engineers, as a rule, are very healthy; do not suffer so much from climate as other officers of the ship; firemen attribute good health to drinking nothing but oatmeal and water, into which limes have been put; officers and stokers not abstainers—all take their grog; those who take too much of course not kept; mostly drink whisky. 7807-7809. Engineers complain of being passed over, but get a reasonable answer, which satisfies them; have one or two second engineers who have been sixteen or seventeen years in that position, and are about 41 to 42 years of age; they will never be chief engineers, but are excellent servants as they are. 7810-7811. Thinks no man has been promoted to the rank of chief engineer under 30; used not to promote a man over 45, but rule has been abolished; it extended to captains also. 7812-7813. Boilermaker messes with young engineers; pay of boiler-makers remains stationary, but receive 1s. 10d. a-day wine money, same as engineers, and insurance fund holds good

with them; not the least difficulty in getting. 7814-7818. When a ship comes into Southampton engineers do greater part of repairs; when work is completed engines are tried, and leave is given to men when they can be spared; no regular leave is given in harbour. 7819-7820. Largest class of ship the "Shannon"; had twelve firemen, ten coal-trimmers, three general assistants, and one engine-room storekeeper. 7821. Engineers working on repair at Southampton would receive 6s. for a day of ten hours, and time and a-half at that rate in addition for over-time; rule the same for boiler-makers; do not work at repair in factory, but if ship is laid up, whole of work is done there, engineers withdrawn, and taken into factory or sent on board another ship; always on pay when at work, but no work no pay. 7822-7827. Firemen sign articles every voyage; are paid off within twenty-four hours of their arrival in England; engineers are simply entered for a voyage, have only to resign at the end if they want to go; all ship's company officers, and all agree for one voyage only. 7828-7831. Senior men supposed to be the best; on becoming chief engineers are given Transatlantic ships as nearly as can be; intercolonial pay is higher, but are made to sign an agreement for two years when going; intercolonial vessels are much smaller. 7833-7835. Some men suffer a little from climate in West Indies, but, as a rule, they do not. 7836. Engineers in Company's service wear a uniform which they have to provide for themselves; their provisions and finding are very complete, everything is found, table and bed linen, plate and cutlery, same as used in saloon; breakages stopped out of pay, but a reasonable amount allowed for. 7837-7841.

WILLIAM WALLACE, Esq.

Is superintending engineer of Allan Line; head quarters Liverpool, have a factory there. 7842-7844. Engineers for their ships taken from no particular source, come from the private engine works of the country. No limit of age on entry, but must have served time as fitters, or in marine engine factory. 7845-7849. Indicated horsepower of largest ship, 3,000, complement of engineers seven, including chief; in new ships all are engineers, there is no boiler-maker; always two engineers on watch at same time; engineers are invariably in three watches. 7850-7856. In summer large steamers run from Liverpool to Quebec and Montreal; in winter to Portland and the United States; two vessels do not make the homeward voyage, one runs from Portland to Halifax; men on same terms as in Transatlantic ships. 7857-7859. When company first started, chief had £18 per month; second, £15; third, £12; all the others, £10; two years ago pay of first three was raised; first got £20 per month; second, £17; third, £15; chief engineers given bonus of £18 a-year after 2½ years if they behave themselves and keep machinery in good order. 7860. Has only served as engineer himself when going out with a new steamer from factory. 7861. Engineers do all repairs of machinery of ships afloat, on return home, examine all the moving parts, pistons, slide valves, pumps, and odd work; three different staffs are employed, one in factory, shore staff, and staff on board; new work done by shore staff. 7862-7863. Factory staff repair ships' boilers, except when a boiler-maker is appointed, in that case take off an engineer, and boiler-maker does the repairs. 7864. Boiler-maker has £10 per month, besides pay found in everything except wines; no allowance for wine. 7865-7870. All engineers mess together in separate mess, chief engineer at head of own department; officers of ship have separate mess; would not agree together. 7871-7874. Engineers of ship always on board; no extra pay for extra work; seldom given leave to come ashore; ship never remaining in port more than a week. 7875-7877. Since have had factory have trained their own men; have sometimes trained them from boys; are at first apprentices, then removed from factory to shore staff, so have experience in taking engines to pieces. 7878-7880. Those coming from factory have no experience of engines; in ships where there are five engineers, a man sometimes goes on for one voyage with third engineer, who perhaps only takes a watch for the voyage; prefers to get men who have experience, but all begin at lower pay first. 7881-7882. Pay raised according to qualities; a man would be a long time before being made a chief engineer; have about 17 chief engineers, they have served some 15 or 16 years, 7883-7886. Has had a chief as young as 30; if chief fell ill or died, would give his place to second engineer if the latter had been a long time in ship, and was next for promotion; would promote by seniority if capable, but there are some second and third engineers he would not promote. 7887-7889. Raising pay and becoming second, third, fourth,

or fifth engineers is according to length of service ; very seldom promote one man over another ; no limit of age to retain man as chief engineer ; should say men would be good for service at from 50 to 60 years of age ; has none so old ; eldest about 45 ; he gets £20 a-month and the bonus of £48. 7890-7896. Before taking they have to pass Board of Trade examination ; asks them to write letter of application to see what their education is ; first and second engineers must pass Board of Trade ; if second engineer could not pass, he would go down to third, and another come above him ; there are men in the service who go on serving, knowing they have no chance of rising ; some do not attempt to pass. 7897-7905. No difficulty in filling up vacancies. 7906. Have not many training in their factory, but after time was out should give them the preference of entry into their service ; would put first on shore staff, and after two or three years send to sea as seventh engineer in large boats, or fifth engineer in smaller ones. 7907. If man applied to enter as junior, engineer would take his indentures, but before putting on board ship he must serve about three years on shore staff ; never send a man to sea without first testing him. 7908-7910. Shore staff supplied by men from other companies, sometimes from Mediterranean steamers ; are first put on shore staff to test qualities. 7911. Generally re-enter same crew, men being discharged formally, and sign articles on same day for another voyage ; shore staff go on board and do necessary overhauling, while ship engineers go to see their friends. 7912-7913. Engineers keep watch, four on, and eight off, and going down channel, watch and watch ; chief engineer keeps engine-room register, each engineer keeping his own register. 7914-7916. A good fitter in factory gets on average 32s. per week, but some receive 36s., and some 38s. a-week. 7917-7918. Engineers have an insurance fund among themselves ; in sickness, get attendance of a doctor ; in the event of death, relatives get £20 ; all sailors and firemen can belong to it ; it is a private concern, the company has nothing to do with it. 7917-7921. Shore party of engineers who are ready to fill vacancies get from 32s. to 36s. a-week as fitters. 7922-7923. Chief engineers only used to mess with passengers ; discontinued in consequence of complaint of junior engineers in reference to mess ; suggested himself to company to make chief engineer head of his own mess, as he thought sometimes the stewards would take advantage of the juniors. 7924-7926. No mess for engineers in harbour, and no allowance ; mess at home with their friends. 7927-7930. No difficulty or com-

plaint about doing manual labour in boilers ; it is understood that the repairs have to be completed when necessary ; when no boilermaker on board, engineers do necessary repairs, if tubes leak they have to go to back of furnace and tighten them. 7930-7933. None of the officers are messed in harbour ; engineers seldom leave service ; company has been in existence twenty years, and some have been fifteen years in service ; are as a rule healthy. 7934-7937. Health compares favourably with that of the other officers ; when sick on board are attended by the medical officer ; at home have no medical attendance. 7938-7941. If sick, would continue on full-pay for two or three months, and then reduce to shop pay or about half-pay. 7942-7943. Iron ships are in compartments ; carpenter responsible for water-tight doors and pumps, and valves away from engine-room ; engineer responsible for those in engine-room. 7944-7946. Chief officer and carpenter see that all is right ; not many valves in merchant ship for carpenter to look after. 7947-7948. Engineer has charge of pumps ; carpenter marks on slate in every watch number of inches of water in each compartment, and engineer works accordingly. 7949-7950. Four or five steam winches on board, chief engineer has charge of ; are generally worked from separate boiler. 7951-7953. Have whistle on main boiler for fog signal ; boilers for working steam winches of less pressure than main boilers ; take steam pressure from main boilers. 7954-7956. Carpenter's pay, £8 a-month ; hand pump. are in charge of carpenter. 7957-7958. In largest ship indicated horse-power 3,000 ; about 30 stokers, including storekeeper, four greasers, and coal trimmers. 7959-7960. Storekeeper gets same as the firemen, £4 15s. a-month, but at present £5 ; coal trimmer's pay, £4 a-month, but at present £4 15s. 7961-7962. Men do not leave, are re-entered continually ; no limit to age on entry. 7963-7964. Place forward on deck for engineers to wash when coming off duty ; firemen have same place ; generally take bath on open part of fore-castle, but no special bath-room. 7965-7968. Thinks complaint of naval engine-room artificers as to being obliged to wash in stokers' bath is not valid. 7967. Boilermakers and engineers of same social class, considers trades equally good ; present foreman boilermaker was 17 years boilermaker in Cunard service, believes he left Cunard line to get on shore. 7969-7972. Evidence as to company's engineers applies to engineers generally going from Liverpool. 7973. Largest proportion of factory men are married. 7974.

Committee on the supply of Engineer Officers and Engine-room Artificers for Her Majesty's Ships.

MONDAY, 11TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., *M.C.*

JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

CAPTAIN JOHN C. SOADY, R.N., *called and examined.*

1. (*The Chairman.*) You are now commanding the steam reserve at Chatham, I believe?—I am.

2. You have commanded both an ironclad ship and a troop ship, have you not?—I have.

3. Will you mention to the Committee the names and the horse-power of those ships?—The troopship was the "Serapis" and the ironclads were the "Pallas" and "Invincible." The nominal horse-power of the "Serapis" was 700 horses, of the "Pallas" 600, and of the "Invincible" 800.

4. Do you remember how many engineers you had on board the "Serapis"?—Speaking from memory, I think that we had a staff of eight, including the chief.

5. In the "Invincible" had you the same number?—The "Invincible" had seven, including the chief.

6. What is the complement of the Indian troop ships?—Eight.

7. Have you had any experience of the engine-room artificers entered by the regulations of 1868?—I think that in the "Invincible" we had three engine-room artificers.

8. Do you remember what duty those men had to perform in the ship?—They were under the chief engineer, and they did all kinds of mechanical work required for the engine-room: they did not do any duty in charge of engines, or anything of that sort.

9. Did they keep watch in the stokehold?—They had jobs of work all day, but no jobs in the stokehold.

10. Are you at all acquainted with the regulations laid down in 1863 for the education of the engineer officers of the service?—No, I am not.

11. You may perhaps be aware that since 1863 they have been far more highly trained and educated than they were before at the dockyard schools, some at South Kensington, and all have to pass a higher examination on entry than they had to pass before that date?—Yes, I am aware of that.

12. Have you any opinion to offer to the Committee on the result of that scheme as to whether it appears to have improved them or not?—No, I have none to offer.

13. Have you any experience of the engine-room artificers in the steam reserve at Chatham?—Yes, we have about 15 of them, and they do their work very well.

14. Are those 15 appointed to the reserve, or are they waiting appointment in sea-going ships?—That includes those in the reserve and the supernumeraries.

15. Are they available for sea service?—Yes.

16. Have you any opinion to offer to the Committee as to the desirability of reducing the number of engineers and increasing that of engine-room

artificers in their place?—I have several times thought of it, and I think it might be beneficial to the service if the engineer staff were reduced, and a large increase in the engine-room artificers made, by making certain alterations in their different positions, and in their pay.

17. In whose position?—In the position of both the engineers and the engine-room artificers.

18. Are any of the engine-room artificers at Chatham, in charge of the engines of gun-boats?—No, they are not, we put engineers in all; and we keep the engine-room artificers for work in the factory.

19. What is your reason for thinking that it would be desirable to reduce the number of engineers and increase the number of engine-room artificers?—Their great grievance appears to be want of pay; the engineers are insufficiently paid, and I think that the State might dispense with the services of so large a body of engineers, if it were to increase the number of engine-room artificers, who would be equally able to do the work that the engineers do at the present time. I would submit that the engine-room artificers, after a certain period of service, some 10 years continuous good service, might have increased pay, and in some cases, under special considerations, be advanced in rank; that is to say, give them a warrant. Then they would be eligible to do the work which is now done by the engineers, in taking charge of engines.

20. Do you think that the wish of the engineers for more pay arises from the higher education which they have lately been receiving?—I should think so, to some extent, and also from the requirements of the day; articles of living are so much dearer now.

21. Notwithstanding that, would you wish to see the standard of education lowered?—Not at all: they should be, in my opinion, a highly, skilfully trained body of officers, and I should like to see the day when the sons of gentlemen would enter for such a position.

22. Whence would you expect that we should be able to get the engine-room artificers?—I do not know from where they will come, but I could give that information by seeing from where they get the men now; however, we get plenty of applications at Chatham, and have to refuse them, because there are no vacancies.

23. Applications by boilermakers and fitters, and so on?—Yes, boilermakers and fitters and moulders, and men of that class.

24. And coppersmiths?—Yes, there are plenty of applications for the place of engine-room artificers, but we have been obliged to send the applicants away.

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25. (*Captain Dowell.*) Are they men at all competent to drive engines?—Yes, they would be in course of time; they would be only competent to do work as skilled men at first.

26. Merely as mechanics?—Yes, but they very soon learn. I know that the engine-room artificers are some times employed to drive the engines of steam-boats.

27. (*The Chairman.*) You are perhaps aware that an engine-room artificer must obtain a certificate from his captain that he is fit to keep watch in the engine-room?—Yes, I am aware of that.

28. Do you know of any volunteers from the dock-yard at Chatham?—I am not aware of any; it has not been brought under my notice.

29. Can you give the Committee any idea of how the eight engineers in the "Invincible" were employed, what their special duties were; who kept watch?—The first engineer, Mr. Scarlett, did not keep any watch, he assisted the chief engineer, he was the senior engineer.

30. Was one of the engineers told off in charge of the water-tight doors and double bottoms?—Two were told off, but they kept their watches all the same, that was for the shutting and opening of compartments and water-tight doors.

31. Did those men in charge of compartments and sluice valves act under the chief engineer in that respect?—Yes, inside the engine-room and stokehold.

32. As long as they were in charge of sluice valves were they under the chief engineer?—Yes, they were under the chief engineer.

33. And he was considered responsible?—Yes, for all the sluice valves.

34. And the pumps?—Only for the steam pumps, not the Downton pumps; the carpenter does the rigging part.

35. Would you consider that a well trained engine-room artificer would be capable of taking charge of the sluice valves and cocks under the chief engineer?—I should think so, certainly.

36. When the "Serapis" was in harbour were most of your engineers employed on the repairs of engines?—Yes, entirely so, repairs of engines and boilers; they were set to work and did a job of work.

37. (*Captain Dowell.*) You say that there are plenty of men who volunteer for the appointment of engine-room artificer, are they willing to enter for the present rate of pay?—Yes, they are; but they get discontented after they enter the service; they come straight to us knowing nothing of the service, and when they enter they are contented enough, but afterwards when they get afloat they change their minds and become much discontented.

38. Have you any idea of the reason for that discontent?—I fancy that money has a great deal to do with it, but a great deal also may be attributed to their treatment and management; it is irksome to a mechanic who is a grown up man to be subjected to the treatment and discipline of a man-of-war.

39. Do you think those men who are easily to be obtained at Chatham, if they received higher wages, would be equal to filling a higher position and making an improved class of engine-room artificer, and be men whom you could place in charge of engines constantly and to keep watch in the engine-room?—With regard to those men entered at Chatham I have no experience.

40. You enter some of them, I suppose?—Yes, some of them; but I have no immediate experience of them to enable me to tell what they would promise, but as a rule they turn out to be very good and skilled men, and trustworthy.

41. And are they educated men who could comply with that circular?—Yes, they all comply with it, they have to go through an examination before they are entered.

42. (*The Chairman.*) Do the engine-room artificers of the steam reserve live on shore?—They all live outside; they are married men and live outside.

43. In the case of those who were in the "In-

vincible," where did they mess?—They messed themselves on the flat, the lower flat.

44. (*Captain Dowell.*) Had you any difficulty with them?—No, not the slightest; there was one man reported to me, but it was for misconduct in the engine room; he was, by the Commander-in-Chief's order, disrated.

45. How did they arrange about cleaning the mess?—A stoker was told off to attend to them.

46. Did he mess with them?—I am not aware. I hear that in small ships they have great complaint that they are made to clean their own messes out as scrub their hammocks, and do other objectionable things.

47. (*Mr. Wright.*) There is no necessity for making them do that, I suppose?—If they do not do it, somebody else must do it for them.

48. (*Captain Commerell.*) Who scrubs the petty officers' hammocks?—They have to scrub their own, I suppose, that is their grievance; they are straight into the service as mechanics, and they do not understand it as ordinary chief petty officers.

49. (*Captain Dowell.*) With regard to scrubbing hammocks, I have always been of opinion that they have a reasonable ground for complaint?—Yes; one of their grievances was the scrubbing of their hammocks, that is, in small ships. I have not had any instance in large ships other than the complaint about cleaning messes. I hear in small ships that they do clean their messes, and there is nobody to attend upon them.

50. (*Captain Commerell.*) You consider that is the prevalent idea?—Yes; and they do not like the falling-in business, and the discipline and coming to muster. I think myself that they should be exempted from all that, such as standing and taking the line, and taking their hats off to officers of division in going their rounds; it is against their grain and coming so late in life into the service, they do not like it. If they fell in at the engine-room, and there was the captain to see them at the engine-room hatchway or in the engine-room, I think it would be much better.

51. (*The Chairman.*) Supposing it were determined to reduce the number of engineers in each ship, and increase the number of artificers to do a large portion of the manual part of an engineer's duty, how would you train practically the young engineers?—I would leave that question for yourself, or for one of more extended information than myself, to give an answer to.

52. (*Captain Commerell.*) Will you look at that list (*handing the same to the witness*)? Would you, now the junior engineers are eligible to attain the highest rank, consider the list of engineer students which you have now before you a satisfactory one in a social point of view?—I should say it was far from being satisfactory.

53. Are you aware that, in consequence of competitive examination without nomination, any lad whatever, provided he has got a moderately good character, can present himself as a competitor?—I am not aware of that. By the navy list instructions it seems that they must produce testimonials of good respectability.

54. (*Captain Dowell.*) I think you mentioned that you thought the engineers might be recruited from a higher class?—I did say so, with an increase of pay, if a high education is to be obtained from them.

55. You think that you could get gentlemen to put their sons from Eton and those places into the Navy, if the engineer mess and the social position were the same as now?—I think that the mess would have to be merged into a general mess of officers. They would have to mess with the other officers if they came in under this extended advantage.

56. Do you see any objection to that?—None, if they are the sons of gentlemen.

57. In the "Serapis," how were the engine-room artificers employed in harbour?—In the same way as the engineer officers, assisting in job work.

58. From your experience of those men, do you think they were competent to assist in adjusting slide facings and those sort of things?—Yes; they were

quite competent, were very good men, and worked very well.

59. Did your engine-room artificers in the "Serapis" ever keep watch in the stokehold, and in charge of the boilers?—Yes, I think so sometimes, but not as a rule. In case of sickness they have been left in charge of the boiler-room, I think. In the "Invincible" they never were.

60. (*Captain Commerell.*) In the "Serapis" did the junior engineers mess in the saloon?—No.

61. Do you know any reason why?—All the engineers messed with themselves. There was an engineers' mess.

62. The engineers' mess was the only mess that existed besides the saloon mess, was not it?—Yes.

63. Do you consider that the promotion at present going on amongst the engineers is satisfactory?—I think that it is very slow.

64. Can you see any way of improving it?—That is a very difficult question to answer. I only see it by earlier retirement.

65. (*Mr. Wright.*) You said that the artificers might be made warrant officers after a time, I think?—Yes.

66. Would there, in your opinion, be any difficulty in finding accommodation for them as warrant officers on board ship, in addition to the present warrant officers, which is one objection to your proposition?—They might mess with the warrant officers in the same mess place, I think.

67. Take the case of the "Invincible"; there were three artificers in her. Now, supposing the engineers were reduced, say five, and three of those artificers were warrant officers, would there be any difficulty in finding accommodation for the three extra warrant officers?—No, not the slightest in the "Invincible" or in the "Pallas" either.

68. (*Captain Dowell.*) And each of the warrant officers to have a cabin besides his mess?—I do not know that they could give them a cabin; as a mess place I speak.

69. (*The Chairman.*) The junior engineers do not have cabins?—No, they do not.

70. (*Captain Commerell.*) I think you stated that you would only make the engine-room artificers warrant officers after ten years?—I did.

71. (*Captain Dowell.*) Are you of opinion that the prospect of being promoted to the rank of a warrant officer would be felt as great an inducement to men to come into the service as if they got the same increase of pay without the rank?—It is possible it might be so; but I think that the rank would be the inducement. At any rate, it would be an inducement

to keep men in the service, as they would have some prospect to look forward to.

72. (*Captain Commerell.*) The engine-room artificer is entered for continuous service for 10 years, would you make him a warrant officer before that 10 years had expired so as to retain him, or would you make him a warrant officer on re-entry?—I would keep him till the 10 years had expired, and then make him a warrant officer if he continued on and was a deserving man.

73. (*Mr. Wright.*) With some increase of pay, I suppose?—Yes, an increase of pay, so that he might have something to look forward to; by that means I think you would retain good men in the service.

74. (*The Chairman.*) In the "Invincible" which of the engineers had cabins?—The chief engineer only.

75. Where did the engineers sleep?—In the steerage, at the starboard side, what we call the engineers' flat. I think they slept in the same flat as the midshipmen, on the starboard side.

76. I think I understand you to say that you believe it would induce the present engine-room artificers to remain in the service after 10 years, if they had the rank of warrant officers, an increase of pay, messed in the warrant officers' mess, and were, as regards sleeping accommodation in the same position as the junior engineers are in at present?—I did say that.

77. (*Mr. Wright.*) A number of the gun-vessels fitted out lately have had two engineers and two engine-room artificers appointed, and the engineers joined the general mess; has that worked satisfactorily, do you know, or is it in your opinion a desirable arrangement?—That has not come under my observation, and I have not heard of it. I may say that one of the grievances of the engineers is, that their junior time does not count at all; they are not able to count their time as assistant engineers of the second class; they are about 26 years of age when they become engineers, and it is generally from 12 to 14 years from that time before they are made chief engineers.

78. (*The Chairman.*) Have you had experience of any engine-room artificers purchasing their discharge?—I do not remember a case, but I am almost certain that I have had experience of it, though I cannot remember it. I think I had best answer that question by saying that I have not had any experience in that way.

79. Has your experience of engine-room artificers been that they have proved a satisfactory class of men both as regards character and qualifications?—Certainly; I have only had one complaint respecting an engine-room artificer during my experience.

(*The witness withdrew.*)

JAMES STEIL, Esq., R.N., called and examined.

80. (*The Chairman.*) What position are you now holding?—I am a retired chief inspector of machinery.

81. But you are still holding some position at the Admiralty, I believe?—Yes, that of inspecting officer of steam machinery.

82. Are you acquainted with the regulations laid down in 1863 for the better education of engineers?—No; I cannot say that I am acquainted with the regulations.

83. You are aware, I suppose, that there were regulations issued at that time?—Yes.

84. Have you observed whether they have had a beneficial effect upon the engineers of the navy?—I think so.

85. Do you consider that in the present day it is a necessity that the engineers of the service should be a well educated body of officers?—I do think so.

86. Have you ever considered whether the time has arrived for a portion of the duties now performed

by engineer officers to be undertaken by engine-room artificers, or a class of men that would be termed engine-room artificers?—Yes, I think so; promotion to the rank of chief engineer is so slow now that I think it is quite time the number of engineers should be reduced and more engine-room artificers employed.

87. Have you ever considered what would be the best mode of reducing the present number of engineers?—By entering fewer students annually. I believe they have been reduced considerably during the last two or three years by not entering a sufficient number to fill up the vacancies caused by deaths, discharges, retirements, &c.

88. Do you think that the inducement for optional retirement is sufficient?—If the age for optional retirement were reduced many might be induced to leave.

89. Are you acquainted with the regulations regarding the retirement of chief engineers and engineers, as to age and other circumstances?—I cannot

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say that I am; it is a thing that I have not paid attention to. I know the age for compulsory retirement in both ranks, which is with chief engineers 55, and with engineers 45, but I will not be certain; 45, I think, is optional, and 50 compulsory.

90. Do you think that if the number of engine-room artificers were increased, if we wished to increase it, that there would be any difficulty with the present scale of pay and regulations in getting men?—Yes, I think there would be a difficulty. I think that we shall lose the men we have now if something be not done for them before their term of continuous service, which is 10 years, expires. I think that some of them have served a little over 7 years now.

91. What inducement to remain in the service would you be inclined to offer them?—A slight increase of pay, and promotion after they had served 8 or 9 years; say 9 years.

92. Promotion to what?—To warrant officers.

93. In making warrant officers of them you do not contemplate giving them cabins, I suppose?—I do not see how it is possible to do that; cabins could not be found for every one of them, but I would give them, after a certain number of years' service, the same pay on retirement that warrant officers receive.

94. Would you recommend that they should mess with the warrant officers?—No; I should like to see the engineers' mess abolished entirely and given up to the artificers. I do not think it would do to mess them with the warrant officers.

95. (*Mr. Wright.*) You would have an artificers' mess the same as the warrant officers' and chief petty officers' messes?—I think that the artificers should have a mess to themselves.

96. (*The Chairman.*) All the artificers, both the promoted ones and the others?—Yes.

97. Supposing they got the pay and pension without the rank, would they be satisfied do you think, or do you think that the rank would be an inducement to them?—I think they would not be satisfied without the rank, which, together with the other advantages of warrant officers, would be a great inducement.

98. Not without the pay?—I do not think that the present pay is sufficient, and if something be not done before their 10 years' continuous service expires, every good man will leave, because while they are receiving now 5s. 9d. a-day in the service they could go into a private firm and get 15s. a-day at once. Private companies are only too glad to get those men who have been thoroughly drilled in the care of steam machinery, and been subject to naval discipline for many years.

99. Are you aware what an engineer gets now after 10 years' service?—Yes, 10s. a-day.

100. Would you consider that after an engine-room artificer had been in our service for 10 years, it would be worth while our competing with the private firms to retain that man in the service?—Yes, I think so; for after that number of years in the service he would be a valuable man, that is to say, if he is of any use whatever.

101. Do you think that we have any chance of keeping any of those present men who are worth keeping after 10 years' service, unless we give them the inducement of which you speak?—I think not, as good men can find immediate employment in private ships.

102. Do you know what the state of the iron trade is at the present moment?—It is slack at present.

103. In what trades would you seek for the engine-room artificers?—I should draw them from three trades, namely, boilermakers, blacksmiths, and fitters; those are the three chief trades required.

104. Would that include coppersmiths?—It would not; good workmen of that trade are difficult to obtain; if they were to be got, I certainly should not reject them.

105. Which of those classes should form the larger

proportion, in your opinion?—I think the fitters should be in the larger proportion. We ought to have one boilermaker in each ship.

106. At present, may we consider that all our engineers are fitters?—Yes.

107. That is their only trade?—Yes; they go through the foundry and other shops, but the vice and the lathe are the principal things to which they have been brought up.

108. Would any of those trades you have named include the founder?—No, it does not; he is called a moulder, and is a very desirable person to have, although it is a trade not required so much as the other trades on board ship. I think it would be well to have a moulder in the flag ship always.

109. Are you satisfied with the qualifications and conduct of the engine-room artificers of whom you have had experience, at present in the service?—I have heard no complaints whatever about them.

110. As far as you know they do their work well?—Yes.

111. If we increase the number of artificers, would you contemplate getting them from the private trade, or would you endeavour to train them in the dockyard?—If we wanted them immediately we should have to get them from the private trade, but it would be a very good thing to train and take them from the dockyard. At present there are machine boys taken on in the factories, and also boys in the boiler shop, and I think that it would be a very good thing to train those boys for engine-room artificers for the navy.

112. Are you aware what sum these artificers have to pay at present for purchasing their discharge?—No, I am not aware of the sum.

113. Would you think it desirable that those youths who are trained in the dockyards should be bound to serve for 10 years, or to pay a considerable sum for their discharge?—Where youths are brought up for engine-room artificers in the dockyard, I consider it would be a good thing. When the engine-room artificer rating was first established, a little over seven years since, we had a great many from the dockyard; that was the time when the yards docks were reducing their number of hands; those men came into the navy immediately, and were very glad of the chance of being able to do so, as trade was slack throughout the country at the time; we had boiler makers, fitters, and blacksmiths, and I believe moulders, in fact, all branches of the engineering trade.

114. (*Captain Dowell.*) Are you aware what pay they were receiving in the dockyard?—From 4s. 6d. to 6s. a-day in the dockyard.

115. And they did not increase their pay by going to sea, they only had the advantage of the rations?—Yes, and seven days pay a-week instead of six. At that time there were a great many very good men whom the authorities were compelled to discharge from the dockyard on account of the necessity for reducing the number of hands, but I am not certain whether the men who have entered since that time have been as good.

116. (*The Chairman.*) Have you heard of any complaints from the engine-room artificers of the mode in which they are treated on board ship?—I have not heard of it direct from the engine-room artificers themselves, but I have heard of it from other sources. I have heard from the engineer officers that the men are quite disgusted with the treatment they get.

117. Do you know the points of complaint?—It is chiefly having to clean their mess out, and to do other menial work, and having no one to attend upon them.

118. That is only in some cases?—Yes, in some cases.

119. And scrubbing their hammocks?—I have not heard of that so much, but I daresay that would be a complaint also.

120. (*Captain Dowell.*) You do not know of any special ship that they have complained of, I suppose?—I cannot remember the ships now; it was a chief engineer who told me of it, and he said they had

good men, and were afraid of losing them, as they got so dissatisfied.

121. (*The Chairman.*) Do you think that the engine-room artificers, now in the service, are, as a body, popular amongst the engineers of the service?—Yes, I think so. I have never heard the chief engineers complain of the arrangement; they have found the artificers to be valuable men.

122. (*Captain Dowell.*) They have been established since you were on active service, I think?—I was on active service at the time, employed at the Admiralty. I made some of the principal recommendations when the rating was established.

123. (*The Chairman.*) During your service in the Admiralty have you been thrown in contact with any of the private Steamship Companies?—I have been occasionally, but not lately. The Royal Mail Company is the principal company with which I have been thrown in contact, through having to attend the trials of their new ships occasionally.

124. Could you give the Committee any information with regard to the staff of engineers the ships of the Royal Mail Steam Company carry?—No, I cannot; I do not know.

125. I do not want the number so much, but have you been thrown in contact with the men?—Yes, I have been with the engineers.

126. I want to know whence their engineers come; do you know from where they recruit their engineer staff; where are they trained?—I do not know. I think they have a large establishment of their own at Southampton; and when the ships come home, or return from a voyage, I believe the engineers go to the factory and assist in their own repairs there.

127. (*Captain Dowell.*) Do you think they train their own engineers?—I fancy they must do so, but I cannot say positively; the company has been established many years, but I cannot say how they recruit their staff.

128. (*The Chairman.*) Do you consider it a *sine qua non* that our engineers in the navy should be a highly educated body of men, bearing in mind the vast amount of machinery we are now introducing into all parts of the ship, far beyond that used in the merchant service or in any other ships in the world?—Yes, I think they should be highly trained; but at the same time I think we are going rather beyond what is necessary at present with the whole of the students; I do not think it is necessary that every student should be trained at the college.

129. You think that the education which they are receiving is rather beyond the requirements?—I think it makes them dissatisfied after they have served their time with the position in which they are put.

130. Considering the class of life in which these young engineer students have been, do you consider that their dissatisfaction is reasonable?—I do not think that it is in all cases.

131. What causes their dissatisfaction, is it the manual labour which they have to perform, I mean the actual manual work which they have to perform, or the position in which they are placed on board ship?—I scarcely think the former; but there are several of the elder students in very good positions now out of the service, and I believe it is their different comparative positions, together with the remote prospect of promotion in the service, which makes them dissatisfied.

132. Are you speaking now of the few who have passed through South Kensington, and who are highly educated at Greenwich, or of them as a body?—I am speaking of those who have received the higher education.

133. Are you aware that a fair proportion of those who have received a higher education are provided with good appointments by the Admiralty?—I know it is so, but of course you cannot find situations for all.

134. Then, in speaking of the engineers being too highly educated, did you refer to the few who receive a special education, or to the whole body of engineer students?—I am speaking of the whole body. Of

course, to men who have an aptitude for learning, I would give the benefit of a higher education, in order to enable them to fill a better position, but for naval engineers generally I do not think it is either absolutely required, or necessary; of course, if a man has a special aptitude for learning, I would give him the benefit of the highest education he could obtain.

135. Do you find that the engineers of the present day are less capable or less inclined to undertake the manual work of repairing engines than they used to be?—I have never heard of any thing to that effect myself, and I have not heard of any such reports from chief engineers.

136. Do you think that if the engineers were much reduced in number a large portion of the manual work which they now do in the repairing of engines could be undertaken by engine-room artificers, which would in itself be considered a boon by the engineers?—It could be and would be, no doubt.

137. And I presume more rapid promotion would follow?—Yes, if the number were reduced. I believe the proportion at present is something over 4 to 1, that is, 4 engineers to 1 chief engineer. Now, it is impossible for the whole of those men to become chief engineers, but if the numbers were reduced to something like 2½ engineers to each chief engineer, there would be a probability then of most of these men being promoted to the rank of chief engineer, if at the same time the number of chief engineers were increased by appointing chiefs to all ships commanded by commanders. I think there are 170 chief engineers now, and I would increase the number to 210; by appointing these additional chief engineers it would add 40 to the present number. If the number of engineers were decreased to 2½ to each chief that would be quite sufficient for the requirements of the navy.

138. Would you consider that engine-room artificers well selected would be on the average as useful in the engine-room as the three junior engineers in a large ship?—Quite as useful. I have looked through the list, and, knowing the complements that we have at present have got out a few particulars relative to this point, putting down the number that I considered would be sufficient for the largest ship.

139. Give us the "Sultan," for instance, a sea-going ironclad?—For the "Sultan," 1 chief, 9 assistants and 4 artificers, is her present complement; I should propose 1 chief, 5 assistants and 8 artificers.

140. (*Captain Commerell.*) The same number but differently arranged?—The same number, but taking away the highly-paid and placing a lower-paid officer in his place.

141. (*The Chairman.*) These are the substitutions which you would suggest as good for the present complements?—Yes (*handing in the table referred to, see Appendix 2.*)

142. You have mentioned five engineers and assistants, would that include one man in charge of the double bottoms?—Take the "Sultan," there is one chief, and one senior engineer told off to assist him, and excused from watch keeping; there would be another junior man told off for double bottoms and watertight doors, and excused from watch keeping; and three engineers for watch keeping, with artificers under them.

143. And that man at the double bottom would take the place of one of those in case of being sick?—Yes, or the senior man assisting the chief engineer could take the watch if necessary. In the case of the twin-screw ships, where the engine-room is divided, you have two distinct ships, you might almost say, for the engineer in one engine-room, where there is a fore and aft bulkhead, cannot know what is going on in the next, especially if the water-tight doors be shut.

144. You speak of the engine-room, not of the stokehold?—Yes.

145. In a double-screw ship you consider that there must be one engineer officer in each engine-room?—Yes, in a double-screw ship with a fore and aft bulkhead, where the engine-room is divided. If you will

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allow me, I will get out my views upon those particular points also.

146. Is it the custom at present for one of the engineers to assist the chief engineer in keeping his accounts, and in work of that sort?—I am not certain whether there is one expressly told off for that duty, but I should think not; there is one to assist the Inspector of machinery, I think.

147. Are you aware what steps are taken to enable any one of the engineer officers to become thoroughly acquainted with the cocks and valves and sluice valves in ironclad ships; is he, as a rule, appointed when the ship is being built?—While the machinery is being put in the ship there is always an engineer appointed with the chief, and that man is in most cases appointed as the senior engineer on the ship being commissioned.

148. But it is not necessarily the officer who is appointed to take charge of the double bottoms and so on?—No.

149. Do you think it would be a desirable or satisfactory arrangement that an engine-room artificer should be appointed to a ship when the engines are being put in, and that he should have charge of the double bottoms under the engineer?—Yes, it would be a very good arrangement, I think.

150. It would release the engineer from special duty in that case?—Yes.

151. (*Captain Dowell.*) If the number of engineers were reduced as you propose, and the work done by engine-room artificers, would you then think that the engineers were too highly educated, or unnecessarily educated?—No, I think not.

152. You said just now that you thought one reason why they were discontented, was because they were so highly educated?—They are discontented because, with their high education, they are kept in an inferior position; were the number of engineers reduced there would be a greater chance of promotion, and this cause of discontent would be removed.

153. The present education would be sufficient?—Quite.

154. Would it not be better to have those men as highly educated as at present?—Yes.

155. And have all the practical work of fitting performed as at present?—Yes.

156. With regard to the engine-room artificers, I think you said that you would promote them to the rank of warrant officers, and place them in an artificers' mess; do not you think that would be a cause of discontent to them?—I think not; as they would be working together I see no reason why they should not mess together. In large ships, probably, it would be better to have all of the same rank, if possible, together, but at the same time I do not think it would be objectionable were it not so; those not warranted may have nearly served their time for promotion.

157. Are you aware that the extreme pay at present that a warrant officer gets, until he becomes a chief warrant officer, is 7s. 8d. a day?—Yes.

158. That would not be sufficient pay, would it?—I think it would, if they had the same inducements that warrant officers have.

159. (*Captain Commerell.*) As far as widows' pensions, and so on, are concerned?—Yes, but the pension after 20 years' service.

160. (*Captain Dowell.*) What pay do you think would be adequate for the artificers at present?—What I would submit is this, that an engine-room artificer, on first appointment, should receive 5s. per day, after three years' service 5s. 6d. a day, after six years' service 6s. a day, and after nine years' service 7s. a day; then, if the man were worthy of promotion, he should be promoted to the rank of warrant officer, that is, 12 months before his continuous service expires; by that means you secure the service of the man for the country for a further period of 11 years, or more.

161. Would you not give him some increase of pay

as a warrant officer?—I did not propose that, but after 12 years' service as engine-room artificer and warrant officer, I would suggest that his pay be raised to 7s. 6d. per day.

162. (*Captain Commerell.*) If you reduce the number of engineers in the way you propose, should you, in the event of war, have a sufficient number of competent men to do the work in our iron vessels and present uncommissioned ships?—You would have to reduce the number of engineers still more in our commissioned ships in order to put engineers into the additional ships that you would commission or hire, whilst they might efficiently be replaced by the substitution of better trained artificers.

163. Do you consider that in case of war the engineer department would be elastic enough?—Yes, I think so; having good trained artificers a chief engineer would be better off now than I was, because I had, when a chief engineer, men who had never been to sea, while now he would have men who had been trained for engine-room duties at sea as artificers.

164. (*Captain Dowell.*) You quite reckon upon the engine-room artificers being competent to take charge of a watch?—Certainly, after being three years at sea.

165. (*Captain Commerell.*) You must largely increase the number of artificers?—Certainly.

166. Do you consider that the list of engine students is satisfactory in all respects, or would be so if the number of engineers was reduced and the engine mess abolished; look at that (*handing a paper to the witness*)?—I should certainly like to see them take from a higher class; this is the first time I have seen this list.

167. Are you not surprised?—Yes, very much so.

168. After reading that list are you prepared to advocate open competition without nomination?—Not after seeing this, certainly.

169. (*The Chairman.*) Do you think if the number of engine students was decreased it would be desirable that the candidates should be nominated by the Board of Admiralty?—I think it would be; you would get a higher class as students, certainly.

170. (*Captain Dowell.*) You do not anticipate any difficulty in getting them?—No, I do not.

171. Do you know anything of the private yards or whether it is a fact or not that gentlemen's sons or people belonging socially to a higher class, are continually training for engineers?—Yes, certainly; I think that it is the case in all private firms.

172. (*Mr. Wright.*) You say that in the event of war you would find the engineer department sufficiently elastic to man our ships, as far as engineers are concerned, but you would fall back upon artificers to make up the complement?—Yes.

173. Would you trust to getting them on the spur of the moment from the private trade, or would you keep up a reserve sufficiently large to fill up the complements of all our ships fit for service?—I think it would be preferable to keep a reserve, and not to trust to the private trade on the spur of the moment.

174. In time of peace, when there are fewer ships in commission, how would you employ those reserves?—That is a question that I have not thought much about, but I think it would be a good thing if they could be employed in our factories in doing the work now performed by the private men.

175. Do you think there would be any difficulty, seeing that they are entered as artificers and have to remain a length of time, in employing them in the factories as workmen?—No, not at all.

176. Do you see any difficulty in giving them a turn in a ship at sea as soon as they enter, and then afterwards giving them two or three years in the factory?—I do not see any difficulty whatever in doing so, and by that means you would have a reserve of artificers accustomed to naval service and discipline at any moment.

177. And you would be perfectly independent of the public for manning all your ships?—Yes, quite so.

I think it would be a very good and desirable thing to do.

178. Do not you think it would be desirable to employ all the artificers in the reserve?—I do not think that they could possibly employ them all.

179. It would be like having two factories in the same dockyard under different heads?—Yes.

180. (*The Chairman.*) In time of war is it not probable that there would be a great increase of activity in the ironworks of England, and a decrease in our shipping trade?—Yes.

181. And if so, would it not, in your opinion, be desirable if we could, to take some steps to establish a naval reserve amongst the engineers in the private mercantile companies?—Yes.

182. Have you thought of any plan by which we could retain the services of the engineers in the mercantile marine?—No, I have not.

183. Do you think that in any system of reducing the list of the present engineers and assistant engineers we might retain the services of the men, who had sought work elsewhere, in time of war?—I think that by offering an inducement we might do so, for example, having a kind of retired list for them to be on.

184. In re-arranging the list of engineers and engine-room artificers, would you not consider it desirable to retain sufficient for all the ships now in the navy?—Yes.

185. To keep sufficient to enable us to put our own seagoing ships in commission?—Yes.

186. Do you suppose that our requirements now in case of war would be greater than they were during the Russian war?—I think not, for we have fewer ships now.

187. (*Mr. Wright.*) But we have larger complements; the complements during the Russian war were like those in the navy list, but the complements now are from a third to a fourth larger?—True, probably more engineers would be required.

188. (*The Chairman.*) What do you propose for a gunboat?—For the old 60 horse-power vessels, two engineers and one artificer; for the "Coquette" class, two engineers and one artificer. In these small vessels I propose two engineers, in case one be sick at any time, otherwise one engineer and two artificers would be sufficient.

189. (*Captain Commerell.*) What is the pay of a fitter in the dockyard?—From 5s. 8d. to 7s.; 6s. is about the average pay.

190. (*The Chairman.*) Have you any information upon this subject of the engineers and engine-room artificers which you could lay before the Committee at the present time?—No, I do not know that I have.

191. Have you any point connected with their position that you would like to speak upon?—I should like to state my views as far as the pay of chief engineers is concerned. The pay on promotion to chief engineer to be 13s. a-day, and after three years' service I would increase it to 14s., and after six years' service to 15s.

192. "Service," not standing?—Yes, the pay increasing according to service as chief; after six years 15s. a-day, after nine years 16s., and after twelve years to 17s. After completing twelve years' service as chief engineer and twenty-two years in the service in all ranks, for each additional year of service an increase of 1s. a-day until the maximum is reached, namely, 24s. per day.

193. (*Mr. Wright.*) You increase the present maximum from 22s. to 24s.?—Yes.

194. (*The Chairman.*) Has it ever struck you that there might be an advantage in having two classes of chief engineers, or any advantage in amalgamating the two classes of assistant engineers?—At present there are chief engineers, engineers and first and second class assistants; I should like to see this classification abolished, and have only chiefs, engineers and assistant engineers.

195. (*Captain Commerell.*) And raise the pay of the 2nd class to that of the 1st class, I suppose?—The assistant engineer on entry, I would propose, should have

6s. 6d. a day, after three years' service as assistant engineer to be promoted to engineer, if found qualified on examination, and paid 7s. 6d. a day; after three years as an engineer, or six years' service, 8s. 6d.; after nine years' service, that is, three years as an assistant, and six years as engineer, 10s. a day; after 12 years' service, nine as engineer and three as assistant, 11s. 6d. I think by the time a man has served that number of years he will be very close upon his promotion to chief engineer, if the number of assistants be reduced.

196. You consider that he ought to be a chief engineer after 12 years' service?—Yes, or very near his promotion to that rank.

197. He will be about 25 years of age when he entered?—About 21 years of age, I take it.

198. Do you know that will quicken the promotion to chief engineer by about 9 years, because at present the average promotion is from 40 to 45, taking the mean of that which will make 42, that will bring the age of a chief engineer to 33?—That is quite old enough for promotion, if he be qualified for it.

199. You consider that he is old enough for promotion at the age of 33?—Yes, quite; I was a chief engineer myself before I was 21, not according to the present rank, but the senior engineer of the ship. If there were an opportunity of promoting a man at the age of 30 years, and he were capable, I do not think that he would be too young for promotion.

200. (*The Chairman.*) If the number of engineers in each ship were reduced according to the scale you propose, it is evident that the younger engineers on first joining will have very little opportunity of learning the management of engines before they are put in charge of the engine-room; what provision would you make for that?—I think there would be plenty of opportunities in large ships for the juniors to learn their duties in the engine-room.

201. You have not got any second man, you know?—Quite so.

202. Under those circumstances do you think it would be desirable to give up a year of their present training at the dockyard to service at sea in order to learn the management of engines?—I do not think that they have too much training in the dockyard now.

203. Even with the understanding that the engine-room artificers would be entered to do a great deal of the repairs that the engineers do now, you do not think it would be desirable to spare a year of that time to learn work afloat?—So much of their time is occupied at the dockyard school that I do not think it is too much; I would not like to see it reduced. I would keep to the 6 years, as I do not consider it too much for practical training.

204. (*Captain Dowell.*) Do you think that 5 years would be sufficient?—I think 5 years quite sufficient, that is with one year for school, making of course the six years altogether.

205. (*Captain Commerell.*) Would you feel inclined to recommend that the year's schooling in the dockyard should be done away with, and that they should pass a higher examination than when they enter as engineer students?—I think the examination is quite high enough when they enter; it is a very severe one.

206. (*The Chairman.*) Do you think that the instruction which the engineers receive in iron ship-building is satisfactory?—I am not aware myself what it is, but I do not think they receive any instruction in iron ship-building.

(*Mr. Wright read a memorandum relating to the subject.*) (*See Appendix 4.*)

(*The witness.*) If the Committee will permit me I should like to state my views with reference to inspectors of machinery. At present there are two ranks of Inspectors of machinery, that is, a Chief Inspector and an Inspector, but there is no difference in the rate of pay; the pay is the same in both cases. Now, I would submit that the rank of Chief Inspector be abolished, and that of Inspectors only used. At present the Inspectors of machinery are the only non-executive officers whose pay does not increase accord-

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ing to length of service; the pay of an Inspector of machinery is 25s. a-day, no matter how many years he may have served it never increases, while the pay of all other classes of officers does: the Inspector-General of hospitals receives after 25 years' service an increase of 1s. a-day; the Deputy-inspector after 22 years' service receives an increase of 1s. a-day, until it reaches a maximum; fleet surgeons of 20 years' total service receive 1s. a-day; the paymaster after 20 years' service receives 1s. 6d. a-day; but an Inspector of machinery gets no increase of pay whatever.

207. (*Captain Commerell.*) A man promoted in 1874 gets the same pay as one promoted in 1866?—Yes.

208. (*The Chairman.*) In the promotion from engineer to chief engineer should you like to see the principle of selection more frequently used?—The promotion to chief engineer I think, in a great measure, is by selection; if the character of the man be not good he is passed over; it is only suitable men for the rank that are selected. With reference to inspectors, I was going to observe that it is possible, according to the present Order in Council, for a chief engineer to receive 5s. per day more than an inspector, and such has taken place. I know, myself, that the chief engineer of the flag ship in the West Indies was receiving 30s. a-day. Now I will tell you how that was made up; he was a senior chief engineer and his pay was 22s. per day; he had 3s. a-day charge money, making it 25s., and 5s. a-day for being chief engineer of the flag ship with no inspector; the inspector of

the Mediterranean and Channel Squadrons getting at the same time 25s. a-day only; so that inspectors are, in my opinion, underpaid altogether.

209. (*Captain Dowell.*) Why would you wish to do away with the rank of chief inspector?—I do not see the use of it. I am a chief inspector, but I am no better off than an inspector made yesterday. I should like, if the Committee will allow me, to state my views with reference to the pay of inspectors, which is 25s. per day. What I would submit is, that the pay of an inspector of machinery on promotion to that rank, instead of 25s. should be 35s., and after three years' service as inspector for each additional year served 1s. a-day extra, until it reaches a maximum of 40s.

210. (*The Chairman.*) Have you regulated your scale by that of any other branch?—It is below the pay of the inspector of hospitals, I think; that gives a service of eight years as inspector in order to receive the maximum.

211. (*Captain Commerell.*) He will get 15s. a-day more than he gets now in five years' time?—Yes, the entrance to be 35s. instead of 25s.

212. (*Captain Dowell.*) What increase does he get at present?—None whatever; it is possible for a chief engineer to receive more pay than he receives; a chief engineer serving in a flagship can receive as much as 5s. a-day, and 3s. a-day charge money, while his day's pay is 22s., making a total of 30s. a-day, being 5s. a-day more than the pay of a chief inspector of machinery.

(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

TUESDAY, 12TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

CAPTAIN CHARLES MURRAY AYNLEY, R.N., C.B., called and examined.

Capt. C. M.
Aynley, R.N.,
C.B.
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213. (*The Chairman.*) What was the last appointment you held?—Captain of the Steam Reserve in the Medway.

214. How long did you hold that appointment?—For three years.

215. While there, had you much intercourse with the engineers and engine-room artificers serving in the steam reserve?—Yes.

216. Have you formed any opinion as to whether it is desirable to keep the number of engineer officers the same as at present, or would you recommend any reduction in their number, and a corresponding increase in the number of engine-room artificers?—For many years I have been of opinion that the number of engineers ought to be considerably reduced; as I consider that, as long as the present proportions are kept up, promotion must be so slow that the best men will be either discontented or leave the service. I think the place of the engineers dispensed with might be very well filled by artificers, or warrant officers, selected from the engine-room artificers after certain service afloat.

217. Do you mean that you would give engine-room artificers, of certain service, qualifications, and cha-

acter, the rank of warrant officers?—Yes, selected ones.

218. Have you commanded a large ironclad ship?—Yes; the "Monarch."

219. Do you remember how many engineers you had in the "Monarch"?—Speaking without book, I think nine; that is, one chief and eight engineers.

220. Are you, then, of opinion that well-selected engine-room artificers might do the duty of a portion of those engineers that you had in the "Monarch"?—Certainly. The only thing to be said against it is this, that a certain amount of the experience obtained as junior engineers would be lost by the substitution of engine-room artificers in the warrant officers' class.

221. You mean by that that they would not be under training in the management of engines?—Yes; not under the same training in the management of engines as they are of necessity at present.

222. Do you lay stress upon the importance of calling them "warrant officers"; or do you think that if they had their pay and pension increased, that that might answer the purpose as well. I suppose your object is to give them an inducement to remain in the

service?—Yes, to give them an inducement to remain in the service; and the chief thing to secure that would be to give them a higher pension, and put them on a higher footing than the other engine-room artificers.

223. If any difficulty arose in giving them the actual title of "warrant officer," would you consider it sufficient if we gave them a similar position and emolument to that held by our warrant officers?—I should prefer giving rather less position and emolument to the greater number, and promoting a small proportion whom you could employ as warrant officers either in the steam reserves, foreign dockyards, and in other places, so that a certain number might look forward to being made warrant officers.

224. I presume you would not consider it necessary that these warrant officers, when they are afloat, should have cabins themselves, any more than the engineers have at present. You must bear that in mind?—If you have a large number of them as warrant officers, it would be impossible to do so in all cases; but if you have a limited number of them as warrant officers, an arrangement might be made in the ships to which they are appointed for them to have it.

225. (*Captain Dowell.*) You suggest a mess with the warrant officers?—Yes; my reason for thinking so is this, that if you do not put them on exactly the same footing as the other warrant officers, there will be discontent amongst them.

226. (*The Chairman.*) Have you been satisfied with the class of men we have obtained as engine-room artificers at present?—As a rule, yes; but on occasions, when the entry has been rather quick, we have got men whom I did not think were properly qualified, either as regards conduct or qualifications.

227. Do you think, if we were to increase the number of engine-room artificers, we should have much difficulty in obtaining them, and from what source do you think we should get them?—I do not think you would have much difficulty in obtaining them, provided that certain things were considered. One thing is this: the men who enter are grown-up men, who have been unaccustomed to discipline; and it would be necessary to be most careful that, while you brought them under proper discipline, you yet did it in such a way as that it would not be felt too much by them at first starting. I think that permanent employment, with the prospect of rising, would induce a good number to enter, but of course you should have a free means of getting rid of them if they were not qualified at the end of their time. That must of course be taken into consideration.

228. Do you think it is likely that the present men we have under the present regulations will remain after the completion of their 10 years?—I can hardly give an answer to that question; a certain number of them are men who have been in the service previously, and those men I have no doubt will remain. How far the fresh entries into the service will remain, I think, will depend upon the ships in which they may have been.

229. Are you aware what pay they get at the end of 10 years?—5s. 9d. a-day. One very great difficulty to my mind, with regard to the engine-room artificers, which I might mention to the Committee, is this, namely, the comparison between them and other artificers in the service. It is very difficult to get artificers now, and if the engine-room artificers have a much improved position on entry, it is very likely to lead to increased difficulty in entering artificers of other classes. I might here mention what I was told a good number of years ago by an official in a dockyard. I asked him how it was that we did not get shipwrights, &c., from the yards, and his answer was this, "You enter engineers who become gentlemen, while their fathers are very likely men who have been working in the dockyard alongside of others who have a family of boys who become shipwrights, and they would be very glad to enter the service, but if they enter a man-of-war their next door neighbours or schoolfellows who have been

brought up and associated with them are officers, while they are on the lower deck, when they come on shore one is a gentleman and the other is not; and you cannot get them to enter as long as that state of things remains."

230. Is not that comparison continued even further amongst the ship's boys and servants; they have in some cases to stand behind the chair of their own schoolfellows?—Yes.

231. (*Captain Dowell.*) Do you know the class from which the engineer officers are recruited?—I am talking of 20 years ago. I fancy now you would find a great number of the sons of dockyard men.

232. (*The Chairman.*) Just look at that list (*handing a paper to the witness*). Are you aware of the class from which the engineer students of the present day are taken?—I was not officially aware of it, but what I see upon this return is very much what I believed to be the case.

233. Do you know from your experience in the Steam Reserve what steps are taken to test the respectability of the parents of the candidates for students?—That is entirely a dockyard and educational question that never came before me.

234. You stated, I think, that in consequence of the stagnation of promotion amongst the engineers, you thought it would be desirable to reduce their number, and to enter engine-room artificers to take their place. Is there any other reason why you think it is desirable to do that?—I think you would get engineers belonging to a better class, because they could then look forward to earlier promotion instead of to a lengthened period in the junior ranks; persons with better qualifications would enter when they saw that prospect before in a reasonable time.

235. You think that even in that way the qualifications of engineers would be improved?—Yes, I think so.

236. Do you approve of the educational system adopted for the engineers of the present day?—I cannot say that I do.

237. Why?—Because I do not think that there is enough practical education, although it has improved of late years, since they have had to pass in the steam reserve. Up to 1873, I think, the examination was entirely a dockyard examination, but in the summer of 1873 the practical examination became a steam reserve one. The work done at the first examination by the engineer students in the Medway was, I may say, most disgraceful, considering the time in which they had to do it; all their attention had been paid to the school; they were well up in schooling, but the practical part of their work they knew very little about; since that time they have much improved, the next year the practical work was very much better, and I understand that the last, which I have not seen, was still better; they find now that they are examined, and have to undergo a stiffer examination in the practical work, which requires them to be more attentive to it during their time as students.

238. Since this circular of May, 1873, has come into effect, do you think that their practical instruction in the dockyard is sufficient to qualify them, and that it will give us a well qualified smaller body of engineers, or would you recommend any alteration?—I should be inclined to recommend a more thorough practical knowledge than has been given even now. Take the case of a large civil engineer's: there, the apprentices to be brought up for civil engineers have to go through the whole of the practical work themselves, as well as the head work, so that they may have a thorough practical knowledge, be able to instruct other men, and to know whether or not good work is being put in.

239. You refer now to the actual work of construction and repair, with no reference whatever to the management of engines afloat?—No, that is another point which has to be learnt later after the foundation has been laid.

240. Do you think that the young engineers now entering are deficient as workmen?—I think that

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they are deficient as practical men, who have a ready resource at all times when there is a breakdown of the machinery. A great number of them who have passed high examinations, in what I may call outside work, very often think themselves so big with their knowledge that they do not care to learn what it may be very necessary for them to know some day.

241. Under no circumstances then would you recommend that the practical instruction in the dockyards should be reduced?—No, certainly not.

242. Is there any mode by which you think it might be improved?—Judging from the questions that were put before them when they passed into the service, I think that a good number of those questions might have been taken away; questions of political economy, the constitution of the House of Commons, and so on,—all those questions might be done away with. I think that a more thorough carrying out of the practical examination would be for the benefit of the service.

243. The practical examination of the engineer students is conducted under the supervision of the captain of the steam reserve now, is it not?—Yes.

244. The captain and officers of the steam reserve have the power of examining them on any points they please, I presume?—Yes. But it is very difficult in an examination, even if it be a practical one, to find out thoroughly what a person really does know; the examination at Chatham took about a fortnight. The work that ought to have been done in the course of a day would take three or four, which showed certainly a want of handiness in the use of tools, although the work might be properly turned out of hand.

245. Could you give the Committee any idea of the description of examination in practical work that they undergo in passing out from the dockyard?—I do not know what it was in the other steam reserves, but at Chatham each student was given a piece of work, coppersmith's, forging, filing and fitting, say a connecting rod with the brasses, or some light work of that sort; the time each student took was noted, and the hours occupied in the work taken down, the examination altogether lasting close upon a fortnight.

246. Are you aware that in addition to the educational examination conducted by the officers of the college, and the examination in practical work at the dockyard, they are also examined in practical engineering by the officers of the Admiralty?—I know that they are examined afterwards at the college, but of the nature of that examination I am not aware. I do not think any of the officers who had passed through the college came to the steam reserve at Chatham when I was there. I left it a year ago.

247. Are you aware of the examination in practical engineering given by the officers of the Admiralty?—No, I am not; I thought that was carried out by the officers of the Admiralty at the college.

248. Have you ever considered, if the number of engineers is reduced, in what way we could fill up our complements in time of war?—In time of war you would have to do with the engineers the same as would be necessary in the case of all other branches, that is to say, make a large promotion from the junior ranks.

249. But we should have to fill up the junior ranks too?—You would have to fill up the junior ranks from the outside; from the outside you will get very excellent men for the junior ranks, although it would be difficult to get men, except in a few instances, competent to take the position of chief engineer.

250. Is it your opinion that in time of war a good many of the large trading steamers would be thrown out of work, and that we could obtain engineers from the merchant service?—That would depend very much indeed upon what Power we were at war with. In all probability if we were at war with any large Naval Power there would be a certain number of merchant steamers thrown out of employment and

engineers might be tempted with good pay to enter the service.

251. Do you think it possible that any plan could be adopted by which the engineers of the merchant service might be induced to join the naval reserve, the same as petty officers and seamen, in which case they would, in time of war, be compelled to serve?—I am afraid that you would find it very difficult. A good number of engineers have left the navy from want of promotion, and others have been dismissed the service; those officers enter the merchant service, and they do not praise the navy, so that it would be rather difficult in peace time to get a reserve up; possibly in course of time it might be got up, but I do not think that you could do it very quickly. I think it is very likely that for steamers in their own ports as harbour defence ships, you would get engineers. I think there is no doubt of that.

252. And for any that might be required in the reserve in time of war?—I mean in time of war, when merchant steamers do not run, we should in all probability require vessels of our own in the different mercantile ports for home defence, and in those cases I think you would be able to get men; but to get men to go to sea, I think there would be a difficulty. In peace time they might promise to come forward for that harbour defence, but no more, I think.

253. Do you think it is probable that we could obtain men qualified to take charge of our own engines in the mercantile ports, and thus release all our sea-going men for our sea-going fleet?—Yes, I think you would be able to do that, but there would have to be careful regulations framed as regards discipline.

254. Are you aware from what source our engine-room artificers generally come?—They come in a great measure from the different establishments round the coast, sometimes when work is slack or strikes going on you can get them to enter pretty well, as also in the winter; but you have to be very careful when you get them merely from slackness of work, because then the worst men are discharged first. In a time of strike, when all men go, you may get good men who are discontented with the strikes and want to get into permanent employment.

255. Do you know whether we get any trained boys from our own dockyards?—You do; the proportion in the Medway, I know, is very small, and I could not tell you off hand what it is, but we did get a few, though I do not think that those were men who had been long in the dockyard. I think that they were men chiefly who came down, and when they found that they could get this employment, they entered as engine-room artificers.

256. Do you think that the fact of having permanent employment for 10 years has been an attraction to them?—I think that it is an attraction to the best men. No doubt there is a good number of men who might enter for a shorter period.

257. If it were found desirable to enter an increased number of engine-room artificers, would you recommend taking steps to train them in our factories at different trades, as boys, bearing in mind that we must have a certain number of boys in the factories?—No, I should take them more generally from round the country; let the boys in the factories volunteer if they think fit; but, I think, from the different places round the country we should get also a better choice; and in time of war, or at any time when we wanted men, others would be more likely to come when they knew that their own shop-mates and school-mates had entered the service, and spoke well of it.

258. Are you aware whether there are many engine-room artificers who have purchased their discharge from Chatham or Sheerness?—Certainly very few; and my impression is, that there was only one man who did.

259. Do you know what they have to pay for their discharge?—No.

260. It is £12; do you think that that amount is sufficient?—I think that for a man who has been a

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short time in the service it is sufficient. I think that it is a payment he would not care to make, but at the same time, if he thoroughly dislikes the service he will pay it. I am considering that we have given them no education or training, nor have they been any cost to us.

261. Would you, under any circumstances, recommend that the sum should be raised?—No, I think not, unless we go on the principle of educating them ourselves, in which case it ought certainly to be raised; the very fact that they are able to leave at a cost that they themselves, with their friends, can pay, permits men to join who otherwise would say, "if I once get into the service, and then do not like it, I cannot get away."

262. Have you considered what pay it would be desirable to give them after 10 years' service?—No, I have not; but I think that in all cases of re-engagement there ought to be a sensible increase of pay; that increase of pay on re-engagement would also keep them in the service up to their time.

263. Are you aware of the wages which men with their qualifications would receive in the private trade?—I am afraid if I say the wages it would not be believed, but I know that working men in some of the ironworks, that is to say, the men who attend the plate mills and are working themselves, in some cases receive as much as £800 a year.

264. Of course, those are exceptional cases, but could you give any idea of their average wages?—True, those are exceptional cases, but they are positions which many men in the works look forward to and hope to gain. The average wages I do not know, but I know that they are much higher than those paid in the navy. But against that must be taken slackness of work, strikes, and things of that sort, and our pensions.

265. (*Mr. Wright.*) The navy is paid for seven days in the week, you know?—Quite so.

266. (*Captain Dowell.*) And they get their rations also?—There is an immense deal of task work in the private trade.

267. (*The Chairman.*) The £800 a-year men are all task work men?—Yes, and others also.

268. Would you recommend the engine-room artificers wearing a kind of uniform?—The senior ones. I would be inclined to divide the engine-room artificers into three classes, the first class a limited number of warrant officers; the class below that, chief petty officers; and the others to be petty officers, or below that. The chief petty officers and the warrant officers not to wear a corresponding uniform to that worn by the others in the lower class. On entry as engine-room artificers, I should not be inclined to dress them in a blue frock, but I would give them a sort of intermediate dress, a jacket, or something of that kind.

269. (*Mr. Wright.*) It is one of their grievances now that they have to wear a jacket, they want a coat?—Yes, I am aware that that has been a grievance with them, to have to wear a jacket on entering from the shore; but I also know that those who have been in the service for a long time tell them they are very fortunate in having to do so, as they have got more money to spend in consequence.

270. How would you mess the three classes on board a large ship like the "Monarch"?—The warrant officers would be with the warrant officers, and the chief petty officers would be in the chief petty officers' mess, and considering that they would, before being made chief petty officers, have to serve a certain time in a man-of-war, the objection is done away with of messing in some cases with people who quarrel with everybody, who are discontented, filthy, dirty, and not fit for the position which they hold.

271. (*Captain Dowell.*) One of the great difficulties in getting men, and the reason why they dislike the service so much, is because they have to scrub their hammocks and clean their messes out, and so on; that might be obviated in the case of chief petty officers, but if you entered them in a junior position

to that it could not be obviated; how would you propose to treat those men when they first enter, because they would dislike that sort of thing?—On first entry I think they might be excused from doing that scrubbing work; they would be in the position of petty officers, and in the petty officers' mess you have arrangements, or arrangements might be made that they should be free from the common scrubbing work, but still as they would look forward at the end of a certain time to getting out of that work, the grievance, I think, would be felt less.

272. Do you think it would work for those men to be in the mess and yet not take the same part as the men in that mess had to take?—If they entered as petty officers you might put one or two of them in the stokers' mess, where they would gradually get into the work, but they might be excused the scrubbing; it is the scrubbing of the mess tables, hammocks, &c., which they complain of.

273. (*The Chairman.*) Did you have engine-room artificers in the "Monarch"?—Yes.

274. Do you remember where they messed?—If I remember rightly they messed by themselves on the starboard side of the upper lower deck.

275. Do you see any reason why the whole of them should not mess together; do not you think they would be more likely to be comfortable amongst themselves?—That would more depend upon how the men came forward; the warrant officers, I think, ought to mess with the warrant officers, and the chief petty officers I would put with the other chief petty officers, so that they should be in the same position as the chief petty officers are now in. Of course it might be a question whether it might not be advisable for the chief petty officers, who are engine-room artificers, to mess by themselves, with the other engine-room artificers also in the same mess.

276. You would like to make a distinction between the upper class of them and the lower class?—Yes, I should.

277. Do not you think some difficulty might arise through attempting to place in the same mess men whose antecedents have been so very different as warrant officers of the navy and engine-room artificers?—No, I do not think so, because when the engine-room artificer becomes a warrant officer he would have been at least 10 years in the navy, and by that time he would have got into naval habits and customs. You find that carpenters enter as grown up men, and they have often only been three or four years in the navy before they are made warrant officers.

278. Have you considered whether any alteration is desirable in the position of chief engineer and inspector of machinery; have you any opinion to give upon that point at all?—None, further than that I think, by having fewer engineers, the consequent increased promotion, and the junior engineers' work being done by engine-room artificers, the chief engineers would be put in a better position, but the question of pay I have not considered.

279. Do you think that a well qualified engine-room artificer who, if possible, would be appointed to a ship while she is building, would be competent to take charge of the double bottom, cocks and valves, and sluice valves, under the chief engineer?—Engine-room artificers are of several trades, if they were well selected according to their trade and had served before in ships for sometime, no doubt they would become perfectly qualified for it.

280. You would not take a fresh entry for that duty?—Certainly not a fresh entry, unless such a thing happened as that you had taken a shipwright.

281. An iron-ship builder?—Yes; but they are not entered at present; if they were entered you might employ them very well for that purpose.

282. Would you consider that a boiler maker was well qualified for that duty?—I should think he would be, the work he had been accustomed to do as a boiler-maker would run in the same line of duty as he would have to perform in looking after ships' bottoms;

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the boilermakers are of three classes, and a selection would have to be made.

283. But all rising one to the other?—Yes.

284. In the dockyards, do you mean?—In the private trade.

285. In the event of its being determined to reduce the number of engineers, do you consider that it should be commenced at once, that is to say, the reduction of the engineers' list, and how would you propose to effect it, by engineers I mean engineers, not chief engineers?—By two ways; first of all, by the optional retirement of a certain number of chief engineers; and secondly, by the retirement of those who may be physically incapable of doing much work, but who should be promoted on retirement, a reduction of entries to take place at the same time: but I do not think there is any system by which you could rapidly reduce the large body of men now in the service.

286. The principal plan which you would recommend is the reduction of the number of engineer students?—Yes, and the retirement of the chief engineers who wished to go, and, of all classes physically incapable of work, this would give a certain amount of promotion to the others.

287. To do that you would have to offer additional inducements for retirement?—Yes, certainly; you would not be able to do it without; but I think when a man gets to be a chief engineer we should be able to allow a certain number to go, and we should replace them from the junior ranks. I do not mean to reduce the number of chief engineers, at present those places should be filled up which would give promotion to the others.

288. (*Mr. Wright.*) The reduction of the number of entries would not take effect for six years?—Yes; but still promotion would be given by the retirement of chief engineers. I do not know whether there may not be engineers at the top of the list who would accept retirement on being promoted to the rank of chief engineer.

289. (*The Chairman.*) Do you think it likely that any of the young students now in the yards would accept the position of engine-room artificer when the pay is revised?—I should say, certainly not, unless they thought that they had no chance of passing.

290. (*Captain Dowell.*) Do you know anything about the engineers in the merchant service, as to how they are entered and from what class?—They vary very much indeed. I have known them to be the sons of gentlemen, officers in the navy, &c.; and I have, on the other hand, known them to be people who have been picked up in the streets. It is also a very common practice for a man to come from the factories where the engines are made.

291. Do you think if promotion were increased, and we reduced the number of engineers, that the sons of gentlemen would be induced to join the service?—A number of years ago I knew a gentleman, an engineer, who held an appointment in a large ship-building firm, and he said to me then, that if in the navy there were fewer engineers entered, and promotion was more steady and quick, so that they sooner went into the ward-room, he was quite confident that a large number would wish to enter the navy.

292. Do not you think that the social position of the men would be improved if, instead of being entered through the medium of a civil service examination, in which case anybody can go up, they were entered by nomination by the Board of Admiralty?—Yes; by nomination, and a good qualifying examination.

293. In speaking of a reserve of engineers, I believe you said that you thought there would be no difficulty in getting engineers to serve during war time in reserve ships; how would you propose to effect that, to enter them as reserves and give them the same pay, or take the chance of their entering?—I doubt if you would get men in peace time to promise to come to you in war time, because they would probably have to give up any appointment, and, perhaps, a very good one, they might hold; but I think a number of

steamers would lay by, and the men belonging to them would enter during war time for harbour work.

294. You would not recommend a reserve of engineers?—No, not quite that; if you could get a reserve of engineers it would be a very good thing, although I doubt the possibility of your getting a good reserve of engineers.

295. Have you at all thought if you reduce the number of engineers in a ship, how many would you require, for such a ship as the "Monarch," say?—It would vary a good deal, because at present the engine-room artificers are not, as a rule, qualified.

296. I mean, supposing we have engine-room artificers who are competent to take charge of a watch or to take charge of the stokehold?—I should think that the "Monarch," would be able to do very well with three engineers.

297. (*The Chairman.*) And a chief?—Yes.

298. (*Captain Dowell.*) What duty would they have?—One engineer would be officer of the watch. I think, that although the duties of the engine-room are heavy at times, yet considering they do not require to be on watch except when under steam, that three watches would be sufficient; in smaller ships you would find that one besides the chief would do, when the engines are not required, then the senior engineer would superintend under the chief.

299. (*The Chairman.*) That is to say, that the senior engineer should keep watch at sea?—Yes, at sea under steam.

300. (*Captain Dowell.*) You answered the Chairman's question with regard to the double bottoms, that you think an engine-room artificer under the chief engineer would be equally as good as an engineer?—Yes, equally as good as an engineer. I think that an engine-room artificer would do the work himself more than an engineer would.

301. (*Mr. Wright.*) One question with reference to the employment of engine-room artificers and engineers that you would get in time of war. Do you think that you would get sufficient from private ships?—Yes, I think so, for all local purposes.

302. Would you propose to enter them as temporary engineers, and pay them accordingly, or would you give them the chance of permanent employment in the service?—That would depend very much indeed upon circumstances at the time. I am inclined to think that we might take them for the war and give them employment during the war, then you get what you want. No doubt there would be men who, when they had been in the navy for a short time and seen what it was like, would volunteer for the service, and those, if properly qualified, you might establish in the navy.

303. If you could adopt any arrangement for keeping a sufficient number of engine-room artificers and engineers to meet all emergencies in the service, and employed them profitably; that would be better than having to trust to getting them in a hurry when you really wanted them?—Certainly, if you could employ them profitably; because you would then always have them at your command when required.

304. In the event of reducing the number of engineers as you suggest, there would be no difficulty about their messing arrangements afterwards, and their joining the gun- and ward-room messes; the engineers' mess would be abolished, and the expense attending it would be saved?—Certainly; the class that you would get to enter the service by nomination would enter into the gun-room, and after a time into the ward-room.

305. The second class assistant engineers are now appointed by warrant?—Yes.

306. You would give them commissions at once, would you?—No; I should be inclined to have them acting for a certain time first, and then they might be dated back so as to give them the benefit of their time after they have been to sea for a certain time. You cannot tell much about a man until he goes to sea.

307. When confirmed you will give them a commission?—Yes, give them a commission dated back to the time of their original entry.

308. At present, they are acting for a year?—Yes.

309. You propose to extend that time?—There is no hardship in doing that, so long as when they are confirmed, after a certain time they get the benefit of that time; and I also think that the time ought to be served in a sea-going ship.

310. If the number of engineers is much reduced in the ships, how will you employ the junior engineers

on first entering the service in order to enable them to gain experience in their duties at sea as naval engineers?—You might attach them to certain ships for the time they are on probation, as supernumeraries.

311. To troopships for instance?—Yes; there are many ways in which you could find employment for them.

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(The witness withdrew.)

MR. MATTHEW MCINTYRE, Engineer, called and examined.

312. (The Chairman.) How long have you been in Her Majesty's service?—16 years.

313. What large ships have you served in lately?—In the "Northumberland."

314. And any other?—The largest before that was the "Adventure."

315. The "Adventure" was a troopship, was she not?—Yes.

316. How many engineers were there in the "Northumberland"?—In the first part of the commission there were two chiefs and six engineers, and in the latter part one chief and seven engineers.

317. That is engineers and assistants?—Yes, engineers and assistants.

318. Were there any engine-room artificers?—Yes, three throughout.

319. Do you remember what trades they were?—We had one boilermaker, and I think all the others were fitters.

320. What duty did they do at sea under steam?—Latterly they kept the stokehold watch; in the early part of the commission, the artificers being a new element in the service, were not trusted with a watch.

321. What horse-power is the "Northumberland"?—1,350 horse-power, nominal.

322. Do you remember the special duties of the seven engineers?—One had charge of the valves, &c.

323. The senior one?—The senior stood off and did not keep watch: one had charge of the pumps, valves and water-tight doors.

324. And did not keep watch?—And did not keep watch; the five others kept watch.

325. One in the engine-room and one in the stokehold?—Yes. But I would observe that there were four watches under steam.

326. Are four watches usual in the engine-room?—Yes, if possible, in ships of that kind always under steam. In some of the large ships the engineers at times are only in three watches, but where it can be arranged they are in four watches.

327. (Captain Dowell.) Did you manage four watches with only five engineers?—We had artificers in the stokehold, making up the number of watch-keepers to eight.

328. (The Chairman.) Who kept the accounts?—I did. I, at first, had charge of the valves and pumps only; but it happened that I was afterwards called upon to keep the chief engineer's accounts in addition. In the early part of the commission the duties were arranged somewhat differently, but I speak of the latter part when we had settled down as it were.

329. When you speak of keeping the accounts, what books were they?—The engine-room registers, fair and rough; the quarterly reports; the store accounts; and the special reports that were called for in the channel squadron.

330. Did you keep any account of the rolling?—We never made any experiments of that kind.

331. Is not there a man specially appointed as an engine-room storekeeper?—Usually there is.

332. Should not he be competent to keep the store accounts?—He should be competent to keep a rough account of the expenditure of stores, but the fair

accounts of receipt and expenditure must be kept by the engineer told off for that duty.

333. Had you a steam capstan?—Yes.

334. Had you charge of the engine to work it?—No.

335. Who had?—One of the other engineers; but it was no one's special care.

336. Were there any other auxiliary engines besides that?—The steering engine.

337. Was that hydraulic, or what?—It was Forrester's steam steering engine.

338. Have you ever considered whether it would be desirable to reduce the number of engineers, and increase the number of engine-room artificers in the service?—Yes, but only with a view to the improvement of the class generally.

339. What class?—Of the department generally I mean.

340. With what object; what are your views upon the subject?—My views are that the number of engine-room artificers might be increased with advantage, provided always that they are good workmen and intelligent men.

341. Would you not consider that they ought to be better workmen than the engineers now are, as a class?—I think so.

342. Because they would give up their time entirely to manual work?—They would simply be workmen.

343. What, in your opinion, would be the advantage of that change?—The great advantage is this, the tendency now, in the case of engineers, is, when repairs have to be done, not to press them with work, but in the case of artificers there would be no objection at all to keep them constantly at work.

344. Would any advantage result in the way of promotion of the engineers, do you think?—I should think so.

345. Do you think that the engine-room artificers as now entered, are well qualified for their duty?—No.

346. How do they fall short of it?—There is a tendency to enter men who are not thoroughly good workmen, simply because good workmen cannot be got.

347. To what particular trade do you refer?—I refer to all trades.

348. Do you think that the men now in the service will rejoin when their ten years' expire under the present regulations as to pay?—I cannot say, as I have no means of forming an opinion on the subject. I should think that the tendency would be for the men to leave the service, because at the end of ten years they have a good deal of sea experience, and that of itself would tell in their favour in finding a job ashore.

349. It makes him a more valuable man?—Yes, a more valuable man in that respect. With respect to his ability as a workman, I do not see that he would be any better than his fellows, and perhaps not quite so good; because he has not been kept quite so close at his work as if he had been in a shop all the time. I understand there is great discontent amongst the artificers, but I have not spoken to any of them on the subject.

350. Have you heard of any particular complaint?

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—Yes, in connection with their position on the lower deck, but of what they actually complain I do not know, as I never inquired.

351. Do you know what their pay is now?—5s. a-day on entry, and 5s. 9d. a-day after three years' service.

352. That is for seven days in the week?—Yes, for seven days in the week.

353. If we increase that pay, do you think that we should have a larger choice?—Yes, decidedly.

354. Is there any inducement, as regards their position or pay, which you think should be offered in order not only to get a larger number of engine-room artificers, supposing we wanted them, but to retain them in the service. I think there should be some inducement.

355. Do you know of any particular inducement?—I am scarcely prepared to express an opinion as to what it should be, but I think that there should be an increase of pay to induce them to remain in the service. It appears to me, however, that these men must also be offered a higher pay on entry, so that you may have a wider field from which to select them, and so ensure better men than are entering now.

356. What dress do they wear now?—A jacket and uniform buttons.

357. A blue jacket and uniform buttons?—Yes.

358. Do you see any objection to that, or do you propose any alteration in their dress, do you think it a matter of consequence with them?—I hardly know. I have not spoken to the men upon the subject, but I have never heard that complained of.

359. What is your pay after 16 years' service?—10s. a-day.

360. What prospect have you of increase?—None whatever that I can see.

361. That is until promoted?—I have almost given up all hope of that; promotion at present takes place after nearly 20 years' service, and I do not know how far I am down the list, as respects my chance of promotion.

362. What was your year?—The latter end of 1866.

363. Have you ever been in charge of engines?—Yes.

364. In what vessel?—In the "Pike," paddle vessel, some years ago.

365. Did you take out a certificate on leaving the dockyard school; were you an engineer student?—No; I came from the private trade. I entered as an assistant engineer in 1859.

366. How much of your time is full-pay time?—Twelve years, in the event of my completing 11 years' service as chief engineer.

367. Your second-class engineer's time would not count by the regulations?—No; and to count the whole of my other service, I am required to serve for 11 years as chief engineer, a thing almost impossible under present conditions.

368. Where were you brought up, or where did you serve your time?—In Glasgow. Neither of the firms where I served my apprenticeship is in existence now; they are broken up.

369. (*Captain Dowell.*) Do you think that the service would be very much benefited if the engineer officers were only superintendents, and not absolutely the working men in the engine-room?—Certainly; that is what I had in view in suggesting this increase in the number of engine-room artificers.

370. What practical education would you consider necessary to render the engineers competent for that?—The same as they now have.

371. You would not alter it?—I would not alter it.

372. (*The Chairman.*) Have you served in the steam reserve at all?—Yes.

373. Are you acquainted with the practical instruction given to the engineer students in the dockyards?—No, not at all; at any rate not sufficiently well to speak about it.

374. Do you know that circular (*handing a circular to the witness*)?—I have seen it.

375. Have you been thrown in contact with the engineers in the mercantile navy at all?—To a slight extent I have.

376. Do you think in time of war any of them would be willing to join our service either temporarily or permanently?—I cannot say, but I have no doubt they would, provided the inducement were great enough. I should think, however, that this source of supply would be very unreliable.

377. Do you say unreliable or undesirable?—I: would be undesirable also.

378. Do you know what is the pay of the engineers in the great steam-ship companies?—Not to speak with certainty; but so far as I have made inquiry it seems to me that in the large steam-ship companies the pay is greater than in our own service, and the prospect of promotion is very much greater, because there the best men come to the front.

379. (*Captain Dowell.*) The prospect of promotion is only for the best men?—Yes, that is all; the worst men go elsewhere.

380. (*Mr. Wright.*) When you were in the Reserve at Portsmouth had you opportunities of seeing the engine-room artificers examined for entry at first?—Yes.

381. Will you describe to the Committee what kind of examination they had to pass?—So far as their intelligence and education were concerned, it was insisted upon that they should be able to read and write, work out simple sums in reduction, and give some account of the working of the steam engine. They were then tried in the factory as to their ability as workmen.

382. Who was present when they were tried in the factory, and who decided upon the style of work which they did?—One of the factory officers.

383. The steam reserve officers had nothing to do with it?—Nothing whatever.

384. When you were there, can you tell me where those men came from chiefly that were entered as engine-room artificers; were they men from the dockyard, or from outside, or where?—From the dockyard, and also from outside, such as men belonging to private firms who happened to be working in the dockyard.

385. Could you form any opinion as to which class of men were the better, those from the dockyard or those from the outside?—The men from the private establishments who happened to be working in the dockyard, were, as a rule, the best men we had.

386. Orders were sent down from the Admiralty to enter a certain number of artisans; had you any difficulty in getting that number promptly?—Yes, great difficulty.

387. Did you take special steps to get them, or did you keep a list of applications?—We kept a list of applications, that was all.

388. Were any inquiries made as to the character or antecedents of the men, and so on; or were any certificates insisted upon on examination?—Yes, always. Whatever certificates they had, whether of apprenticeship or character, had to be shown; and, as a rule, applicants were called upon to explain their whole service from the date of apprenticeship down to the date of examination; that is, where they had been, and what they had been doing.

389. Your opinion is that if engine-room artificers were to be more largely employed in the service in lieu of engineers, they should be a better class of men than that which we have been in the habit of getting?—Certainly.

390. When you entered the service as an assistant-engineer, what were your ideas as to your future in the service?—I was informed that I was almost certain of promotion within twelve years.

391. Who informed you?—Mr. Murdoch, inspector of machinery. At that time promotion actually took place within twelve years; but since then the time has gradually increased until now it is nearly twenty years, and, as I have just said, I have hardly any prospect at all.

392. (*Captain Dowell.*) How old are you?—38 years.

393. (*The Chairman.*) And you cannot be promoted after what age?—There is no limit except 50, when I must retire; but, I think that after a man has served in a subordinate position until he is 50, or even until he is 45, he is hardly fit for promotion.

394. (*Mr. Wright.*) Do you think that the engineers in the navy, as a body, prefer to have a separate mess as at present, or do you think that they would prefer to go into the gun-room mess?—I think that the feeling is towards abolishing the present engineers' mess.

395. Do you think that many of them would not prefer having the present mess on the score of less expense than they would be put to in joining another mess?—The extra expense would weigh undoubtedly with some. For instance, the expense of messing in the ward-room would be greater than that to which they are put at present, and there would be some hesitation about it on that score; but I think that the feeling is to abolish the engineers' mess altogether. This hesitation is not to be wondered at, for the great body of engineers are men with families. In my own case, I find myself at 38 years of age, with 10s. a day and a family, and of course I must keep down my expenses on board ship as much as I can. In that respect I think the service must suffer; because, where men have to contend against home difficulties, they cannot do their duty so well or so willingly as they otherwise would.

396. (*The Chairman.*) And besides that, they would be seeking to leave the service and to get work elsewhere?—No doubt of it.

397. (*Mr. Wright.*) Had you anything to do with the practical examination of the engineer students on leaving the dockyard, for entry as naval engineers?—I saw some of them examined in the Steam Reserve.

398. But you had no immediate connection with that examination?—No, nothing whatever to do with it.

399. Could you form an opinion as to whether they are better workmen now than the men were some years ago?—I could not form any opinion.

400. (*The Chairman.*) Could not you form an opinion as to the relative ability as workmen of the engine-room artificers when first entered, and that of our engineer students when they have completed six years at the dockyard?—I should prefer an artificer, decidedly.

401. That is, to do a job of work?—Yes.

402. To do the work well and thoroughly?—Yes.

403. In the shop, at the lathe?—Yes, the actual manual labour. If I wanted it well and thoroughly done, I should prefer an artificer.

404. Although you may have a very good artificer on board, yet, if you suddenly found all the water run out of your boilers, which do you think would be the better man to act in the matter, an engineer or an artificer?—I think that is almost entirely a question of experience and I should think that the most experienced man of the two would, in such a case, be the best, apart altogether from the workmanship.

405. Although a man was a good workman, that would not make him ready of resource, and that sort of thing, you mean?—Quite so; not a bit of it. I should expect to find a leading stoker, one who is not a skilled workman, with two years' experience as leading stoker, a better man in dealing with the ordinary accidents of the engine-room than an assistant engineer or an engine-room artificer of one year's experience.

406. Have you any further information which you are prepared to give the Committee, or any recommendations to offer which you think would be good for the service?—I do not know whether you have thought of this. I have always thought that there should be an engineer officer specially appointed to look after the double bottoms in large ships. I had the duty to do myself in the "Northumberland," and could see the necessity of having an officer told off

for that duty alone. I think also that he ought not to be subordinate to the chief engineer, but subordinate to the commanding officer.

407. Would you put him in charge of the sluice valves?—Yes, the water-tight doors, sluice valves, and double bottom generally.

408. And the pumps?—Yes, and the pumps; everything out of the engine-room, in fact.

409. Including the small engines working the capstan?—I would not care so much about that, but including the small engines that work the pumps.

410. (*Mr. Wright.*) When those parts wanted cleaning or repair, if you had an authority independent of the chief engineer, would it not create confusion?—The cleaning and painting of the double bottom and the repair of the fittings could only be done by men told off specially as required.

411. (*The Chairman.*) What men?—Just as at present. Men are now told off to do that duty from the engine-room department or carpenter's department, or otherwise, as they can be spared.

412. (*Mr. Wright.*) If some one were in charge of those parts, in that case he would have to make a requisition to the commanding officer, who would order the men to give assistance?—Yes, exactly as was done by the carpenter of the "Northumberland" when his portion of the double bottom wanted cleaning and painting.

413. Do you think that would be better than being subordinate to the chief engineer as now, and making the chief engineer responsible for that work?—Yes; I think so, because there is sometimes a tendency to make the engineer officers take charge of that duty in rotation, and the result is that none of them know the duty well and thoroughly. Again, the officer in charge of that duty has in some ships to keep watch, and there is consequently a risk that at the time this thing or that thing is wanted, it is not to be found. I mean that there is a tendency to employ these officers on other duties, which appear to me to interfere with the proper fulfilment of the special duties referred to, and this, in my opinion, is a mistake.

414. Supposing the man gets on the sick list, how would you do then?—Pretty much the same as is done now. Another is sent there temporarily, and he to some extent depends on the stokers, who are always at that work.

415. Instead of having one man acquainted with the double bottoms, and so on, you would have two or three?—If necessary.

416. (*The Chairman.*) Why should that necessarily be an engineer officer, if you do not give him charge of the machinery as well; would not a good engine-room artificer, as a boilermaker, be as good a judge of a double bottom as anyone else?—He would be as good a judge, no doubt, but he would not have the same authority to act. Of course on board ship a great deal depends upon the rank held by persons in charge, and I think that the officer charged with this duty should in large ships be a chief engineer, or an officer of equal rank, so as to be able to do the work well.

417. Who would he have under his control?—As many men as were required to keep the fittings clean and in order, not to repair them.

418. Told off for that duty alone?—Yes, told off for that duty alone, and not to be interfered with. I had it so in the "Northumberland." I, of course, was subordinate to the chief engineer there, but really all I had to say in the matter, I said also to the commanding officer.

419. (*Mr. Wright.*) According to the regulations the chief engineer is responsible for all that work?—Yes.

420. And ought to be acquainted with all that is going on?—Yes.

421. But in the case of a man being appointed as you propose, the chief engineer need not be acquainted?—No, he need not be.

422. Do not you think that would be a disadvantage?—It might be a disadvantage.

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423. (*Captain Dowell.*) Do not you think also, that from the fact of a certain portion of the double bottom being absolutely in the stokehold, and all communications with that double bottom being through the engine-room and stokehold, it might clash in that way with the engine-room department?—Really, there was little of the work in the “Northumberland” in the engine-room and stokehold.

424. Take a ship like the “Hercules”?—It would be the same there, the pumps are outside and most of the watertight doors and valves are outside of the engine-room and stokehold.

425. How about the double bottom?—Part of that, of course, is in the engine-room.

426. That would be an important part of your charge, and the largest portion of it?—The largest, but not by any means the most important portion. My remarks refer more especially to the pumps, watertight doors, and valves, and not to keeping clean the double bottom.

427. Are the men you spoke of continually told off for that duty principally employed in cleaning the double bottom?—No. The men I had were employed in keeping the pumps, valves and watertight doors in working order; the double bottom was kept clean by special parties told off for the purpose.

428. (*The Chairman.*) Have you any further remarks to offer?—No.

429. (*Mr Wright.*) In the “Northumberland” there were seven engineers and three artificers. Supposing you were chief engineer in the “Northumberland,” and there was to be a reduction in the number of engineers, and an increase in the number of engine-room artificers, what number of men would you like to have to perform the engine-room work of that ship efficiently?—Five engineers and five artificers.

430. (*The Chairman.*) Always supposing that we can get good engine-room artificers?—Yes.

431. (*Captain Dowell.*) What pay would it be necessary to offer to obtain a higher class of engine-room artificers?—Not much less than 6s. a-day; at Sheffield, where I am doing duty at present, I find that good workmen have 6s. 4d. a-day for six days in the week, and I am told that in London the pay is higher. You would not get good men unless you paid close on 6s. a-day.

432. (*The Chairman.*) As far as you know do we get many engine-room artificers out of the dockyards now?—I do not think so, and I do not think that they are good men. In fact I think there is a tendency

amongst the dockyard workmen to say that any one meaning any inferior workman, will do for an artificer.

433. (*Mr. Wright.*) Were there any complaints from the artificers in the “Northumberland” as to the manner in which they were treated in the way of accommodation on board?—Not to any serious extent. I think that was rather avoided by letting them have a stoker to help them in their mess. The artificers were kept at work below, and stokers sent to do the mess work as far as possible.

434. (*The Chairman.*) Did they mess by themselves?—I think that they messed with the other chief petty officers.

435. The master-at-arms?—The master-at-arms messed by himself. There is just one other thing I should like to mention. There has been some talk of abolishing the rank of second-class assistant engineer, and it appears to me that to do so, making assistant-commissioned officers from entry, would give them a better prospect.

436. You mean that they should enter the service direct as commissioned officers?—Yes.

437. Do you mean that as regards their immediate position, or as regards counting their time?—Both, but chiefly counting their time. Not so much the abolition of the title “assistant engineer of the second class” as that the time should count.

438. Are you acquainted with many engineers who decline to qualify as chief engineers, in order that they may take advantage of retiring as engineers?—Yes, a great many.

439. Do they optionally retire at the age of 45?—Yes. It appears to me that as soon as they attain that age they are anxious to go. Not only is it so with respect to officers not qualified. I know a number who are qualified for chief engineers, but who propose to go, if they can, at 45 years of age. I am aware the question of their being allowed to go has not yet been raised, but I believe it will be.

440. (*Captain Dowell.*) Do you know of any other grievance of which you have heard the engineers in the service complain?—There is nothing else that I can remember at present. I spoke to you of my having served 16 years without any near prospect of promotion; and I would repeat that an increase of pay seems to be a present necessity with all engineers.

441. Quickness of promotion would remedy all those defects?—Yes, undoubtedly, in the future; but there seems to me to be wanted an immediate present remedy.

(*The witness withdrew.*)

JAMES ROFFEY, Esq., R.N., called and examined.

J. Roffey,
Esq., R.N.

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442. (*The Chairman.*) What is your position?—I am a chief engineer.

443. In what ship did you last serve?—The “Lord Warden.”

444. In the Mediterranean?—Yes.

445. How long were you in her?—Four years and nine months.

446. What is her horse-power?—1,000 horses nominal.

447. What complement of engineers had she?—We had two different complements, having had two different commissions; in the first commission we had six engineers.

448. By “engineers” you mean engineers and assistants?—Yes.

449. (*Captain Commerell.*) Besides the chief?—Yes, besides the chief.

450. (*The Chairman.*) How many did you have in the last commission?—One chief, five engineers, and two engine-room artificers.

451. Did you find that a sufficient number for working the engines?—Yes, generally; we frequently had supernumeraries on board; we had to apply after-

wards for a permanent supernumerary, and the complement was increased one.

452. Can you tell us how they were employed, and what their special duties were?—The senior engineer was employed to assist me in keeping the records of the engine-room, and in all detailed work. In carrying out the general orders of the engine-room.

453. He did not keep watch?—No, he did not keep watch.

454. (*Captain Dowell.*) He was chief executive?—Yes, to assist in carrying out the routine of the ship, and the other engineers were employed in watch keeping and doing repairs.

455. (*The Chairman.*) Was one told off for charge of the double bottom?—She was a wooden ship.

456. You had one in charge of the cocks and valves, I suppose?—The senior looked after those; we generally employed one artificer in looking after the Downton's pumps and valves; three of the engineers had each charge of the engines, and the others did extraneous work.

457. What engines?—In the engine-room, for all the fittings.

458. Had you three small engines?—Three main engines with three cylinders.

459. And three pairs of cranks, and everything?—Yes.

460. In how many watches were the engineers?—In four watches.

461. Always?—Nearly always unless we were working all boilers, and then they were in two watches.

462. Had you an engineer to keep watch in the stokehold, or an engine-room artificer?—An engine-room artificer generally.

463. Of what trade were the engine-room artificers?—Fitters and boiler makers; we had one blacksmith.

464. Supposing you had, of your own free choice, to draw up a complement of engineers and artificers, what complement would you propose for the "Lord Warden," without reference to the navy list. You know the work you have to do, how many engineers, and how many engine-room artificers, would you like to have?—Four engineers and three artificers.

465. Besides the chief?—Yes.

466. What trade would you wish the artificers to be?—One fitter, one boilermaker, and one blacksmith.

467. That is a matter of importance, is it not?—Yes. The boilermaker could assist in the blacksmith's work, and the blacksmith could assist in the boilermaker's work. You can ring the changes with those men better than with the other trades.

468. Were you satisfied with the men you got as artificers?—Generally; I had two that I was not satisfied with.

469. You mean two out of all those that have passed through your hands?—Yes; I had several supernumeraries.

470. Have you ever been employed in the steam reserve at a dockyard?—Very little.

471. You have had no special employment there?—No, no special employment there.

472. Do you know the pay which the engine-room artificers in the service receive?—Yes, 5s. a-day on entry, and 5s. 9d. after three years' service.

473. Do you think that the men you have come across in the service worth keeping, are likely to remain in the service after their ten years shall have expired, at that rate of pay?—No.

474. Why not?—Because by that time they would have become valuable as watch officers in the engine-room, and they would be able to obtain employment in the mercantile marine.

475. As what?—As engineers; many of the companies take boiler makers.

476. As a rule, which do you consider is the better workman, a fitter that you have got as an engine-room artificer, or an engineer student who has just come from the dockyard?—A fitter; a good fitter is reliable at all times, if he has had a little experience in watch keeping.

477. What particular defects do you find in the young engineers when they join?—I have not had much experience with the young engineers; it has not been my lot to fall in with any of the new junior engineers; those that I have had served their time in private yards, with the exception of one. It is as far back as 1860 and 1862 that I am speaking of.

478. Do you think that those men who have served their time at private yards are more useful men than those we educate?—As far as my experience goes, yes. In 1862 I had two juniors, and one of them had served his time in a naval yard, but I have had none since.

479. Of what standing was the junior one in the "Lord Warden"?—About four years' standing as an engineer.

480. Did you do the duty of inspector of machinery at all in the Mediterranean?—Yes, for a short time.

481. Do you remember how many engine-room artificers there were in the fleet?—It did not come before me; the return was not made to me at all, but most of the ships carried them.

482. Did you do any repairs to the other ships with the engine-room artificers?—No, not under my

direction. In the "Lord Warden" I had most of the repairs done by engine-room artificers, the boiler work and so on; they were generally employed about boiler work in the "Lord Warden." We had a good deal to do to keep the boilers going, and we generally employed the engine-room artificers upon that work, the boiler maker and blacksmith.

483. That refers to the answer which you gave me about the complement of the "Lord Warden." Do you consider it desirable that the number of engine-room artificers in the service should be increased?—Yes.

484. How do you think that we shall get them?—By offering them good terms.

485. Could you give any idea as to what terms we ought to offer them?—I think a little increase of pay on entry, and to increase their pay after five years' service, and when an artificer has been a certain number of years, say, perhaps, five years a watch keeper, he should be made a warrant officer; he should be warranted, which is some inducement to hold out to him to continue in the service; you must improve his position.

486. What do you mean by making him a warrant officer, what especial advantage do you look to giving him; is it the title, or rank, or the pay, or the pension, or what?—All combined.

487. Which is the more valuable; the pay and pension, or the rank and title?—The pay and pension, I think, are the most valuable; but to make him a warrant officer would give him a better standing in the service.

488. What is your idea with regard to the messing of the engine-room artificers?—That they should mess with the chief petty officers, as laid down at present.

489. Or if that is inconvenient, mess by themselves?—Yes, in many ships where there is a number, that would be far preferable.

490. When raised to the rank of warrant officers, where should they mess?—With the warrant officers.

491. You think that there would be no difficulty in that?—No, from the appointment of those men on first entry, I think it is advisable that they should.

492. Do you think that they would get on together?—I think they would, and that it would be advisable.

493. Do you think that they ought to have a cabin?—I think that a sleeping berth could be provided.

494. A separate berth of some sort?—Yes.

495. (Captain Dowell.) No hammock?—No, no hammock.

496. (The Chairman.) What dress did the engine-room artificers wear on board the "Lord Warden"?—The usual blue cloth dress.

497. With uniform buttons?—Yes, excepting when working below.

498. A jacket with uniform buttons and a cap?—Yes, the regular uniform, as laid down by the service regulations, a cap and badge.

499. (Captain Commerell.) It is a uniform like that of the master-at-arms, only with the cap and badge?—Yes.

500. (The Chairman.) Do you know whether the engine-room artificers have any complaint to make of their treatment on board ship or any reasonable grievance?—They very often complain of want of consideration; their duties are specially for the engine-room and yet they are frequently wanted on deck when they should be below, or they have to clean their mess, or may be scrub their hammocks, when their services are required below. There is some difficulty on the deck about their mess. I think with regard to the messing there is very often a complaint, although it specially states in the circular that they are to mess with the master-at-arms and the other chief petty officers; the mess generally is too small for all the chief petty officers, and the engine-room artificers are the ones, as far as my experience has gone, that have to stand off and to mess with the carpenter's mate, and cooper, and other petty officers.

501. Would you think it desirable to reduce the

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Esq., R.N.

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number of engineers generally throughout the service?—Yes.

502. And to increase the number of engine-room artificers?—Yes, certainly.

503. Why do you think that?—Because I think you would get a better staff for the repairs of the ships, and you would cause a better flow of promotion among the engineers.

504. Do you think that it would improve the class of engineers in the service?—Yes.

505. Do you think that it would enable us to carry on the present system of education without deteriorating them?—Yes, I think so.

506. Are you in favour of the present system of education?—Yes; but I think the entry of engineers ought to be open to others, that is to private firms, if it were so it would be better for the service, in my opinion.

507. If in addition to educating our own engineer students we admitted those from private firms on passing an examination?—Yes, I think from my knowledge, that the students, as brought up in the dockyard, have to devote so much of their time to study, that practical attainments they do not consider to be worth going in for at all, at any rate not to learn in a general way.

508. Could not that difficulty be got over by insisting on a very severe examination in practical work before they leave the dockyard?—I think so.

509. Are you aware that it has been carried out to a much greater extent during the last two years than it was before?—I am not aware of that, I think that many knowing that the service is open to them on acquiring a certain amount of knowledge sufficient to pass their examination, get that information and come into the service, whereas, at the time I entered the service, engineers had no idea of being brought up for the service until they were called for, and they went on at their practical work, which was their means of livelihood.

510. Where did you serve your time?—At Woolwich dockyard.

511. There is no doubt that great practice and experience in manual work are of great value, still if we introduce engine-room artificers to a larger extent we shall throw much of the work upon them?—Yes, decidedly.

512. Would that have the effect of placing the engineers and engine-room artificers more in the relative position of officer and working man than is the case at present?—Yes, I think so.

513. Do you think that would be beneficial?—Yes.

514. Would you think it desirable that chief engineers should be selected from engineers more than they are at present, or do you think that promotion by seniority is the best possible system?—I think the best system of promotion is by seniority, as a rule, and a number on some special occasions.

515. What should those special occasions be?—Through any special act of bravery or self-sacrifice in case of war, and so on.

516. Any one, at present, who chooses to put his name down as a candidate for entry as an engineer student is allowed to compete?—Yes.

517. Do you think that is a good system?—I do not think it is; I think that there is a general dislike to that system, and it is thought that some preference should be given to the parentage of the applicants, the social position should be considered.

518. Then I take it that you consider it would be better if nominations were given by the Board of Admiralty?—Yes.

519. And you think it would be more easy to do that if the number of entries was reduced?—Yes, very much easier to do that if the number of entries was reduced.

520. If the entries are very much reduced it would be a necessity to make some selection of that sort?—Yes; and likewise it would be necessary to make a selection from the students themselves, so as to give the better men the opportunity of entering, showing

that they possessed the best scientific and mechanical attainments. If they threw over the mechanical attainments they would be in the hands of the artificers altogether.

521. Do you think there is a feeling amongst the present engineers in the service that they would rather keep the present engineers' mess or do away with it?—They would rather do away with it.

522. And go where?—Into the gun-room.

523. How would the men with little money to live upon like the additional expense?—I do not think it would be an additional expense; the senior men will generally be employed in charge of small ships.

524. Do not you think that a difficulty would arise in the case of a young engineer with a large family, as many of them have, on 10s. a-day, in support of the expense of a more expensive mess?—I do not think that the expenses are higher in the gun-room mess than in the engineers' mess. I think the engineers, after a certain number of years' service, ought to have the option of messing in the ward-room, the same as the assistant paymaster.

525. What age do you think they should average for eligibility for promotion to the rank of chief engineer?—I should think 32 to 35 years of age at the latest.

526. You would recommend a reduction in the number of engineers?—Yes.

527. In what way do you think that reduction could be carried out?—I have not thought of that. I should like to think that matter over, and put it down on paper.

528. Do you think that quicker promotion is very much needed amongst the engineers in the service?—Yes, there is a great call for it; many of the engineers have from 10½ to 12½ years' service as engineers. Even if they passed their examinations and obtained promotion within the stipulated time laid down in the instructions for assistant engineers, they would have to be 17 or 18 years in the service before they obtained promotion to the rank of chief engineer; if they entered at the age of 21 then they would be 40 years of age before they obtained promotion. It is seldom that they can obtain promotion before the age of 38 or 40 unless by some special act.

529. You have not served in an iron ship, have you?—No.

530. (*Captain Dowell.*) Are you acquainted with the mercantile marine at all, or have you been thrown in contact with the engineers in the mercantile marine?—In China I was, but that is so long ago; it was in 1858.

531. What class of men are they generally as compared to ours?—They are generally good engineers.

532. And socially?—Yes, good.

533. Are they superior to our engineers generally?—Oh! dear no.

534. If we reduced the number of engineers, what should we do in the event of war?—We could get plenty of engineers by offering inducements, we did during the Russian war; at first they found a difficulty I believe, but they did get them afterwards.

535. Do you think there would be any difficulty in establishing a reserve of engineers from the mercantile service?—There have been difficulties; there were a very few that would join the royal naval reserve.

536. They were not paid?—No.

537. Do you think if an inducement were offered them they would join?—Certainly I do, and be very glad, no doubt; in the mercantile marine they have a great number of good engineers who would be very glad to come.

538. (*Captain Commerell.*) Do you know how the engineer students are put upon the competition list?—No, I do not.

539. Do you think that the selection of engineers from the engineer students would check the applications to become engineer students?—No, I do not.

540. Do you want to see that checked?—Yes; I think it would be beneficial.

541. Do you think the engine-room artificers have

any valid complaint about these regulations?—I cannot say that I know of it; there are many cases in my experience where I have had to get special arrangements made to meet little difficulties: for instance, the ship's company will get the afternoon on Thursday, say, and general leave, but the other men cannot always be spared, that is to say the engine-room department cannot be; many times I have had to ask for all leave to be stopped, or for leave to be given at some other time. At the time the ship is going into port the ship's company may have nothing to do, and that is the time that engineers have to do repairs, and I have had to keep all the hands on board; by applying to the captain there has been no difficulty in having special leave granted.

542. How did you manage in the "Lord Warden," with only two engine-room artificers for the stokehold watch?—I applied for another one.

543. The engineers were in four watches, and the engine-room artificers in three watches?—Yes, they could easily do that because the engineer was changing his watch-mate.

544. Supposing you had not been in the flag ship, how would you have managed?—I would have applied for one in addition.

545. (Captain Dowell.) Is it not customary for the engineers to be in three watches?—It depends upon the complement of the ship; in many cases they are in two watches; if we had eight boilers going we should want two artificers in the stokehold, you could not look after eight boilers without it.

546. (The Chairman.) Had you two boiler rooms?—No, one; if you are steaming fast you would want two artificers on watch.

547. (Captain Commerell.) You mentioned that you should like to see the number of engineers reduced?—Yes.

548. What proportion would you wish to see the engineers bear to the chief engineers?—I should like to consider that question.

549. At present it is about $4\frac{1}{2}$ engineers to 1 chief. There are 170 chief engineers and there are $4\frac{1}{2}$ engineers to each one of those chiefs?—I should think it should be about $2\frac{1}{2}$ to 1.

550. (Mr. Wright.) You said that in the "Lord Warden" you could do with 4 engineers and 8 artificers, but in a ship where there were 9 engineers and 4 artificers, how many engineers could you do with; take the "Sultan" for instance?—She has single engines, and I look upon that as a point to be considered; 4 engineers and 8 artificers.

551. (The Chairman.) You would keep about the same number?—Yes. I think in many special ships it requires some special arrangement, although the ships may be of the same power the construction makes a great difference; for instance, there is the "Dreadnought" and the "Inflexible," and others, which are different ships.

552. (Mr. Wright.) I understand also that if you reduce the number of engineers very greatly, and increase the number of artificers in the same proportion, you will not want a greater total number of engineers and engine-room artificers than you have now?—Not in that class of ship.

553. An artificer will be just as good as an engineer?—Yes.

554. (The Chairman.) Have you any information to give the Committee, or any opinion to offer as to an improvement in the position of engineers, or chief engineers or inspectors of machinery?—I think an inspector of machinery ought to have an increase of pay, and a chief engineer after 20 years' service; after 20 years their pay only increases 1s. a-day to a maximum of 22s. a-day; and, as compared with others, they do not stand well at all: a paymaster increases up to 31s. per day, and can retire on £450 a-year. An inspector of machinery only gets 25s. a day; in the case of a chief engineer he has only part of his junior time that he can count; and if there is one point upon which engineers feel sore it is not being able to count all their time. If the Committee will

allow me I will hand in the following suggestions which I have compiled, after giving the various subjects my careful consideration (handing in the same as follows):—

Suggestions for the improvement of the position of Inspectors of Machinery Afloat.

The pay of inspectors of machinery afloat to increase with servitude, as it is very hard upon these officers at present that no increase of pay is given, no matter how many years they may serve, and even when promoted to chief inspector of machinery afloat, except when serving in a steam reserve, when the pay is increased from 25s. to 28s. per day.

	Full-pay. £ s. d.	Half-pay. £ s. d.
The full-pay of an inspector of machinery afloat on promotion	1 13 0	1 0 0
On completing 3 years' service	1 15 0	1 2 0
To increase 1s. per day for each year's service, until the maximum is obtained	2 0 0	
Half-pay, after 5 years' service and	—	1 8 0
To increase 1s. per day until the maximum is obtained	—	1 8 0

Retirement.

If completed 3 years' service and	£450
£10 per year additional for each year's service until the maximum is obtained	500

Inspectors of machinery afloat to be employed on the China, East Indies, West Indies, Pacific, and Home Stations.

Suggestions for improved position of Chief Engineers.

	Full-pay. £ s. d.	Half-pay. £ s. d.
On promotion, if under 15 years' service	0 13 0	0 8 0
" " 16 "	0 14 0	0 9 0
" " 18 "	0 15 0	0 10 0
" " 20 "	0 17 0	0 12 0
" " 22 "	0 18 0	0 14 0
" " 25 "	1 0 0	0 16 0
To increase 1s. per day for each year's service until the maximum is obtained	1 5 0	

Charge money to remain as at present.

Half-pay, on completing 25 years' service, to increase 6d. per day for each year's service until the maximum is obtained	—	0 18 0
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Retirement.

Maximum retirement after 30 years' service .. £450.

Chief engineers to be employed as superintending engineers at Gibraltar, Halifax, and Vancouver's Island dockyards; Engineers are at present holding these appointments.

Suggestions for improved position of Engineers and Assistant Engineers.

	Full-pay. £ s. d.	Half-pay. £ s. d.
Assistant engineer on entry	0 6 6	
To be confirmed in that rank after 1 year's service, if found qualified.		
After completing 3 years' service, and if found qualified on examination, to be promoted to engineer	0 7 6	0 4 0
After completing 6 years' service, including assistant engineer's time	0 9 0	0 5 0
" 9 "	0 10 0	0 6 0
" 12 "	0 11 6	0 7 0

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The senior engineer in ships (captain's command) to be called the senior engineer, and to receive 1s. per day in addition, and to have a cabin.

The engineers' mess to be abolished, engineers and assistant-engineers to mess in the gun-room, and after 9 years' service to mess in the wardroom (optional).

Retirement.

6d. per day for each year's service, maximum 10s.

Suggestions to reduce the number of Engineers on the Active List.

1st. Increase the number of chief engineers from 170 to 220, chief engineers to be employed in all ships (commander's command.)

2nd. Allow engineers of and above 40 years of age to retire on 6d. per day for each year's service, irrespective of their having passed for chief engineer; maximum retirement 10s. per day. All time served to count towards retirement. The number of engineers to be reduced until the proportion of engineers to chief engineers is as 2.5 to 1.

Suggestions in reference to Engine-room Artificers.

To give the engine-room artificers a properly recognised position, relative to their respectability and responsibilities in Her Majesty's service, they should be made warrant officers: all warrant officers to mess together. The engineers' mess being abolished; the engineer steward to be the warrant officers' steward, and an assistant steward allowed for general cleaning purposes in the mess and wash place; sleeping accommodation being hammocks near the mess place (hammockmen being allowed).

		£	s.	d.	per day.
The engine-room artificers to receive on entry		0	5	6	"
After 3 years' service		0	6	0	"
" 6 "	If qualified to take entire charge of a watch 6d. per day extra pay, and after 12 years' service, if qualified as above, to be made chief warrant officer.	0	6	6	"
" 9 "		0	7	0	"
" 12 "		0	7	6	"
" 15 "		0	8	0	"
" 20 "		0	8	6	"

To receive pensions and retire on the same scale as warrant officers.

Suggestions to provide a Reserve of Engine-room Artificers.

To provide for the increasing demand for a reserve

of engine-room artificers for Her Majesty's service, and more particularly in the event of the country being suddenly plunged in war, I beg to suggest that an efficient and reliable reserve could be maintained in Her Majesty's dockyards, by placing a number of skilled workmen, as undermentioned, upon the establishment of Her Majesty's dockyards at all the principal seaports, on condition of their being available for service afloat under certain regulations.

1st. That each reserve engine-room artificer shall serve at least three years at sea in Her Majesty's service; and on completing this term to return to the dockyard where he had been formerly employed.

2nd. That he shall serve from two to three months afloat in the channel or reserve fleets every three years, and at such other times when called upon.

3rd. On first entry for service afloat for three years, a fixed sum of money shall be granted for outfit; and when serving afloat for periodical service or otherwise, such remuneration to be given as may be determined upon.

By these means an efficient body of skilled and trained reserve engine-room artificers would be available for service in the reserve fleets and coast defence ships.

Engine fitters and millwrights	..	10
Proportion of each	{	Boilermakers .. 2
		Blacksmiths .. 1
		Coppersmiths .. 5

555. The second class engineer's time?—Engineers under the old system do not count the thirds time; some lose three, four, and four and a-half years time, an inspector of machinery is only paid 25s. a-day, except when in charge of the Steam Reserve, when he gets 28s.

556. Has the chief engineer any extra pay?—When afloat, according to the power, when in charge of machinery.

557. He gets charge pay, but in no case does his pay come up to that of the paymaster, unless a junior paymaster is put in a large ship where there is a chief engineer of good long standing, his pay there is made up to 22s. a-day in addition to his charge-money; but that loss of junior back time is a great consideration, because many men now who are made chief engineers at forty years of age and upwards, cannot possibly put in their 11 years' service to count, even the junior time allowed.

558. You mean that they are never allowed to count the thirds time?—Yes; quite so.

(The witness withdrew.)

[Adjourned to to-morrow at 12 o'clock.]

WEDNESDAY, 13TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.
CAPTAIN WM. M. DOWELL, R.N., C.B.
CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.
JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

THOMAS THOMSON MURRAY, Esq., R.N., called and examined.

T. T. Murray,
Esq., R.N.
13 Oct., 1875.

559. (The Chairman.) What position are you holding now?—That of chief inspector of machinery afloat in the Medway Steam Reserve.

560. How long have you been there?—I have been

in the reserve between Chatham and Sheerness about five years and a-half.

561. What ship were you in before that?—In the "Asia," immediately before that at Portsmouth. My

last sea-going ship was the "Gibraltar," 800 horse-power.

562. (*Captain Commerell.*) What year was that?—I was in her from 1861, having been appointed to her before she was completed, until we paid off in the end of 1866.

563. (*The Chairman.*) You have had some experience of engine-room artificers in the service, I presume?—Yes, considerable. Since I have been an inspector of machinery, I have had a great deal of experience with them.

564. How are they generally employed in the Reserve in the Medway?—In doing the necessary repairs of the reserve, and in any work that we can get from the dockyard, when we have not immediate work of our own; in repairing the engines of pinnaces and launches, when we can get it to do, and sometimes the hulls, when of steel or iron.

565. Can you remember how many there are in the Reserve in the Medway at present?—In the Reserve, at present, there are 16.

566. Of those how many are available for sea service?—I think 15 out of the 16 are available for sea service. One's time has just expired, and he is now waiting his discharge.

567. When you say that they are all available for sea service, do you mean that they are all supernumeraries ready for appointment?—We are allowed to keep 5 out of the 15 on the staff of the floating factory; 10 out of the 15, therefore, are immediately available for sea service.

568. Have you a fixed number or complement?—We are ordered to keep 15, if possible.

569. Have you any difficulty in filling up the number?—We have had no serious difficulty yet. Once or twice I have, under the suggestion of the engineer in chief of the navy, sunk the educational status a little in order to obtain suitable men.

570. What steps have you taken to get them?—I have only once had to send to various naval stations, stating that they were wanted. Once Captain Aynsley applied to you to have a notice posted up at Greenwich, and you said you would; and we generally have notices posted at Deptford, Chatham, and Sheerness dockyards gates.

571. Where do the men that are entered generally come from, from the private trade or the dockyards?—From both; but the men, as a rule, we had originally have been men belonging to the private trade, although in many cases we have had men actually brought up in the dockyards.

572. Brought up as boys?—Yes, some of them; coppersmiths and boiler-makers especially.

573. Have you been satisfied with the class of men you have got as workmen?—As a rule. We have had, I think, on one or two occasions, to solicit their discharge from the service as being incompetent after trial.

574. What is the longest service of any you have there, the longest as an artificer? I am not quite clear, because the two senior men I have in the reserve have been brought up as stokers in the service, have been leading stokers, chief stokers, and then eventually engine-room artificers; and it is one of those whose service now expires.

575. What time is his service?—It would be his 20 years in the service.

576. Then I suppose he counts all his stoker's time and engine-room artificer's time?—Yes, the whole of his time.

577. The circular establishing the artificers was issued in 1868. Do you know of any men who entered when it was first issued?—Not any at present, except those who have entered from that same number of chief stokers.

578. Do you think it is probable that any of the men now in the service as engine-room artificers will re-enter after their ten years expires?—I think that some will, although there is a little dissatisfaction existing on account of some of the arrangements in the service. Still I think that several may re-enter.

579. What are their chief reasons for dissatisfaction, or of what do they chiefly complain?—The chief grievance with them seems to be that they have nothing further to look forward to in the shape of promotion after they have been actually confirmed as engine-room artificers; that is the chief thing. The second, I think, arises as much from some grievances that exist locally on board certain ships, as anything else, and which could be removed by a little consideration from the commanding officers themselves.

580. Will you specify them if you can?—I should need to enter into a little detail upon that. As far as I can understand from them, because I have not had them at sea under myself, but knowing what their duties are, it seems they will be frequently detained in the engine-room after the other men leave it, or at least perhaps with a few other men, in making the necessary repairs and getting the ship ready for sea, and they are not always up to exact time to be clean and ready for quarters or divisions, or anything of that kind, as the case may be, and they have been frequently punished for that when it was not always their fault, although in many cases they might perhaps have helped it a little themselves. Still I have heard of those cases arising, and when I have called upon the chief engineer, with whom the men were serving, to tell me how the things were, I have heard from him that their statement was substantially correct.

581. Are those men generally then inspected by the executive officers on deck, or by the chief engineer in the ship?—By the executive officers on deck. It is perhaps immediately while the ship is under steam, or it is perhaps in the daily routine in harbour, when they are overhauling the machinery and various things of that sort.

582. Is there any other point of dissatisfaction?—One other strong point upon which they appear to have a grievance, is one that seems to affect all skilled mechanics on board ship, considering the style of men that they are, and that is, that there is a certain amount of menial work which they are supposed to do, such as scrubbing messes and hammocks, and various duties of that sort, which is almost foreign to them before entering the service, and that they consider degrading them below what really is the status of mechanics. It appears to me to be rather a difficult question to meet, but still I fancy it might be met in some way.

583. It is met in some ships, is it not?—(*Captain Dowell.*) As far as the mess is concerned, it is.

584. (*The Chairman to witness.*) You stated, I think, that their first and serious grievance is not having to look forward to increased pay and promotion?—Yes.

585. Have you considered any scale of pay for them which you think would be reasonable?—I have not laid it down in any way, although I have just thought over it in my own mind. I think, with a certain amount of promotion held out to them, that their pay on entry would be sufficient, but if possible there should be a slight increase annually. I think it would have a most beneficial tendency altogether throughout the service if there were a slight increase of pay annually. It would not matter so much the amount altogether as that there is something to look forward to, and that it increased by continuous service. The amount might be safely left in the hands of the Committee, and if they wished any scale drawn up there would be no difficulty in drawing up a scale; but I know as a rule the Admiralty do not like scales drawn up by the people themselves.

586. (*Captain Dowell.*) What do you think the maximum should be?—I think from 7s. to 8s. a-day, that is, when it comes on to the latter part of their continuous service; and if they were given a chance of promotion from engine-room artificers, after they had been in the service a sufficient number of years for the service to know the men thoroughly, and for the men to be well acquainted with the service, I think if some of the best of them were given the chance of obtaining a warrant, with its necessary accompaniments of pension and uniform, it would have a great tendency not only to increase the contentment of those

T. T. Murray,
Esq., R.N.

13 Oct., 1875.

T. B. Murray, in the service, but it would also secure a better supply of men and a supply of better men.

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587. (*The Chairman.*) In the event of these men wishing to leave the service at the end of ten years, what position do you think they would seek in the private trade?—I think that a great number of them, if they have thoroughly made up their minds to do it, would try to work themselves up so as to be able to pass the examination of the Board of Trade, if they came within its provisions, and to get service afloat in the merchant service.

588. As engineers in the merchant service?—Yes, as engineers in the merchant service. As it is now, those I have known who have gone get picked up for launches and for second engineers in gentlemen's yachts, and that very frequently.

589. Do you mean that they should receive 7s. or 8s. a-day before the completion of their first term of continuous service?—I mean that they get up to that by the end of the first ten years. They might go on rising, and get 7s. a-day about the expiration of the first ten years.

590. How many engineers had you in the "Gibraltar"?—Our complement was five, but we were allowed an additional one as a supernumerary by the Commander-in-chief out there.

591. You had no engine-room artificers?—No, we had none. The rating just came out about the time I was there.

592. Looking to the state of the list of engineers, and the present regulations as to the education of engineers, have you ever considered whether it would be advisable to reduce the number of engineers, and to increase the number of engine-room artificers?—I have considered the subject, but with all large ships I scarcely see how you could do without having one engineer in charge of the watch. I think they might be easily reduced as low as that.

593. So as to ensure having one engineer in charge of the watch?—Yes.

594. Did you have the engineers in three watches or in four?—In three, except under very special circumstances. We have frequently had them in two watches and four.

595. Have you many of the young engineers, junior engineers, at work in your factory afloat in the Medway?—I have had none of them actually at work for some period now. We found, when we did have them, that they were not well skilled as a rule, and were rather indifferent about their work.

596. Of what period are you speaking now?—During the last five years' experience with the floating factory. At the early period, the first three years of it, I had them frequently on board, but there were continuous complaints from the engineer in charge of the factory as to the indifferent mode in which they performed their work.

597. If you had a job of fitting work to do, who do you think would do it best, a young engineer or an engine-room artificer?—The engine-room artificer. I should decidedly depend more upon him than I would upon the other, although amongst the engineer students I have found some very good ones. I have found some not only well skilled as working mechanics but also very able otherwise; still they are the exception, and not the rule.

598. Have you had to conduct the examination of engineer students on leaving the dockyard on the completion of their term in the dockyard?—Not except very lately. Now the captain of the steam reserve and the chief inspector afloat of the reserve have to sign their certificates with regard to their knowledge of practical duty, and since that order has been given I think that their work has been much more efficiently performed.

599. Are you aware of that circular (*handing a circular to the witness*)?—Yes, this is the circular to which I refer.

600. Since the issue of that circular you have had them?—Yes, and I have seen a marked improvement. I objected to sign the certificates unless the students

themselves were sent to the floating factory for a certain period to undertake the practical work themselves, under my own supervision or the supervision of one of the chief engineers or the the engineer of the floating factory.

601. They had to undergo an examination under your supervision as to their practical knowledge of manual work?—Yes, as to their practical knowledge.

602. You think that their practical knowledge is improved during the last two years?—Yes, no doubt the very fact of having a leading man put over them in the factory to superintend their work necessarily their doing it better and being more constantly at it. He is responsible in some degree to the chief engineer of the dockyard that they do perform it.

603. Do you consider that an engineer student at the completion of his time in the dockyard, is equal in knowledge of practical work to an engine-room artificer?—This circular has not been sufficiently in operation yet to enable us to form an opinion thoroughly. Some of our artificers are men capable of taking a stand in any factory in the country, and some of them are, of course, not so good; we have a method of trying the artificers until we actually see them, and then if we happen to enter one and find that he is unskilled we are obliged to ask permission to discharge him from the service as incompetent.

604. Do you think it is probable that we should be able to insure a full supply of engine-room artificers by entering them in the different trades as boys in the dockyards, or would you rather trust to the private trade for them?—I should leave the thing entirely up both to the dockyards and the private trade. I don't being able to get a full supply from the dockyards.

605. Do you see any objection to boys being apprenticed to the different trades in the dockyards on the understanding that they are to become engine-room artificers in the same manner as the engineer students are to become engineers?—The difficulty would be in increasing the supply of those boys and finding proper employment or training for them during their time in the dockyard.

606. If the number of engineer students was reduced that difficulty would be met to a certain extent?—To a certain extent, yes.

607. Are you aware what the ordinary average pay of a fitter in the dockyard at Chatham now is?—I think that the pay is about 5s. 6d. a-day.

608. For six days in the week?—Yes.

609. What do the junior engineers do now at Chatham when not on board the floating factory?—The local orders that we have with reference to ships oblige me to keep two engineers attached to every ship which is under repair by the dockyard, and this nearly absorbs the whole of the reserve I have, which they are so distributed between those and the ships in the fourth division of the reserve. A certain number of them are also employed under the chief engineer or one of the chief engineers of the reserve, and also in a general working party of stokers at the dockyard; in coaling ships they have to take charge of parties of men when detached.

610. What is the duty of those engineers attached to ships for repairs?—To remain by the ship during the entire day, from bell ringing in the morning till bell ringing in the evening, irrespective of hours, and to attend specially to fires and lights and any danger resulting to the ship, even during the silent hours of the night.

611. They have no mechanical duties?—No, no mechanical duties.

612. When a ship is building at Chatham is there always one engineer or more appointed to the ship from the time she is begun to be built?—Not immediately she is begun to be built, after a certain part of her hull is completed or her engines have arrived at a certain condition, an engineer or chief engineer is appointed, sometimes both.

613. Are any steps taken to enable the engine-room artificers to become acquainted with a ship's bottom while she is being built?—No, none whatever.

614. In the event of the number of engineers being

duced, do you think it would be desirable that the engine-room artificers should be appointed to ships in the same way, under the chief engineer, as at present, so as to become thoroughly acquainted with the double bottoms and water-tight doors and the cocks and valves in the bottom?—I think it would be beneficial to the service if it were so. In fact I think that if the chief engineers were occasionally appointed earlier than they are at present it would be more beneficial.

615. Where did the engineers mess in the "Gibraltar"?—In part of the gun-room, fitted under your own superintendence at the time.

616. Do you think that there is a desire amongst engineers to do away with the engineers' mess?—It has always been a more or less doubtful affair, some are for and some are against it. The majority now, I think, appears to be for doing away with it.

617. I suppose their objections to it would be the increase of expense to men with families?—That was one objection; the other was with regard to the arrangement of meals and the hours not exactly suiting them; but those objections could be obviated.

618. Do you consider that the present system of admitting engineers to the service by open competition, without any special nomination for each candidate, is a satisfactory way of obtaining engineers?—So long as you admit them by open competitive examination, you must just submit to them coming from any class of society where a boy of 14 years of age is of sufficient ability to pass the examination.

619. Are you aware that the authorities might still, if it were desired, have educational competition, and yet nominate candidates to compete?—Yes. I should prefer it by nomination first, and then by competitive examination afterwards.

620. Looking at that list of the engineer students who have been entered during the last three years, do you think it is satisfactory as regards their social position and parentage, bearing in mind the good education that they receive and the good position in which they are placed in the service? (*handing the list to the witness*).—I do not consider it particularly satisfactory. I have no doubt that if the system were by nomination you would get a more satisfactory class, and a class that would work more harmoniously with the rest of the service. That is only one of the fruits of open competitive examination. It would affect all classes in the service in the same way. I think that if the system of competitive examination with nomination were adopted, it would conduce greatly to the benefit of the service, and you would have a superior class of men generally in it.

621. (*Captain Dowell*.) Do you think that if no alteration were made in the present position of the engineer officers in the service, we should still get an improved class to enter the service?—I think they are improving as they are now.

622. To what do you attribute the improvement?—To the improved supervision on the part of the authorities in the dockyards.

623. You mean to say more particularly with regard to the examination, and that sort of thing?—More particularly in seeing that they are actually doing their work. The appointment of a leading man, to which I alluded, over the engineer students, I think has materially tended to the improvement of the students themselves in their manual labour.

624. Do you think that the officers are socially improved, or that they are more qualified to take their position in society as officers?—I have not had an opportunity of being at sea with them sufficiently to understand what they would be able to do, but the few that I know personally are quite qualified and competent to take their station in any society. Of course there are exceptions amongst them, as must be the case from the very nature or strata of the society from which they are drawn. Their antecedents and their connections must to a certain extent lower their social bearing, or at least it must take them some time

to get out of their early condition, or rather to emancipate themselves entirely from it.

625. You say that you think the number of engineers might be advantageously reduced. Have you at all any idea what number you would recommend for such a ship as the "Alexandra," say?—For such a ship as the "Alexandra" you would want at least one engineer in charge of the watch, along with any number of engine-room artificers that it might be thought desirable or advisable to retain for her work.

626. Would one engineer be sufficient, do you think?—I think so, quite sufficient for the charge of the watch.

627. She has a double screw, has not she?—Yes; the "Alexandra" herself is a special ship, with a fore and aft bulkhead, which renders her much more difficult to deal with.

628. But all ships in future are likely to be made in that way?—That of course renders the case more difficult.

629. That is the reason I ask you, because, in providing for these things, such cases must be taken into consideration. Have you thought of it at all?—I think still that one good engineer would be sufficient in charge of the watch, provided you have sufficiently experienced engine-room artificers under him in whom he could place dependence, his great difficulty being more with regard to the boilers than the engines.

630. (*The Chairman*.) Are you aware that at present the engine-room artificers are very often in charge of the stokehold?—I am aware that in small ships they are constantly so, as there is not a sufficient number of engineers to do the duty.

631. But even in large ironclads are you aware that it is the case?—That they are in charge of the stokehold? I am not aware.

632. (*Captain Dowell*.) How many engine-room artificers would that take in the "Alexandra"?—I do not think that you could well do with less than four on the watch along with the engineer.

633. (*Captain Commerell*.) Four in a watch at once?—You would require one at each stokehold and one at each pair of engines, and the engineer would have to supervise the whole. It would require him to be constantly going round that ship to enable him to do his duty properly. She has two distinctly separate stokeholds. I suppose she is the first we have had in that way, and both pairs of engines are entirely separate. That would necessitate, at least in the early stages, what I say; but whether you would ever be able to reduce the number to three artificers and an engineer I cannot say, though I should not recommend it at the first going off.

634. (*Captain Dowell*.) You have never been at sea in one of those ships with a double bottom, have you?—No, I have never been at sea in them.

635. But you know a great deal about them, I suppose?—I have inspected them.

636. Do you think it necessary that an engineer should be detailed for duty in the double bottom?—Unless you have some person holding a responsible position, you cannot always depend upon their report.

637. Do not you think that the engine-room artificers would do for that duty?—Of course, when you give the engine-room artificers something to lose, and there is a likelihood of their being discharged from the service for any neglect of duty, the case would be greatly different; at present, with the exception of those who have been in the service for a long time, and would not like to lose their pensions as chief petty officers; the others feel that they have little to lose, and therefore care very little whether they leave the service or not.

638. (*The Chairman*.) Are you satisfied with the promotion of engineers?—No, we cannot be satisfied with that.

639. Do you see any means of expediting it?—Not except either by reducing the numbers or doing that and overloading the other lists. I think, myself, that one means of expediting promotion, and, I think, one that would really conduce to the benefit of the

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service, would be to put a chief engineer in every ship commanded by a commander.

640. At present the engineers form a proportion of four and a half to every one chief engineer; if the number of engineers was reduced, as we speak of, that would in itself expedite promotion eventually?—Quite so.

641. Would that, in itself, be considered a great boon by the engineers of the service, do you think?—It would indeed.

642. It would be a gain to them, I suppose?—The slowness of promotion now, I believe, is really injuring the service in many cases, because it seems to me to have robbed two-thirds of the engineers of their usual zeal in the service.

643. Would you wish to see chief engineers promoted by seniority or by selection, after a certain period of service?—As a general rule by seniority, yet I think that cases ought to be reserved for selection.

644. Selection for what cause?—For special services; some special services that their Lordships might consider sufficient to induce them to depart from the general rule.

645. Would you limit it to special services, or leave it for special qualifications?—It is not easy to distinguish exactly a man's special qualifications in that way, unless and except he shows them by some special service.

646. Unless they are very marked?—Yes, unless they are very marked.

647. (*Captain Dowell.*) What you would mean to say more is, that you would not promote a man who was inefficient?—Quite so. A man who did not attain the necessary qualifications to fit him for the position would, as a matter of course, be passed over.

648. (*The Chairman.*) Do you think there is any reasonable ground of complaint with regard to the pay of chief engineers?—I do not think that their pay is sufficient; indeed, I think that the pay throughout is insufficient.

649. Is there anything connected with the inspectors of machinery, or chief inspectors of machinery, that you think might be improved with advantage?—Both the chief inspectors and inspectors complain, as a matter of rule, upon the insufficiency of their pay, and besides that the chief inspectors continually have to complain of the chief inspectorship being simply an honorary rank, without conveying any benefit with it whatever in any shape; the only benefit it does convey at all is a slight difference in relative rank, and some little increase of pension to the widow, which certainly does not affect the chief inspector himself.

650. Chief inspectors are always employed?—Yes; there is one thing, of course, in connection with it, which is, that they cannot be sent to sea, or at any rate there is no immediate chance of their being sent. I suppose their lordships could send anybody to sea they liked; the inspectors certainly, both with regard to their pay, and more especially with regard to their half-pay, are placed at a very great disadvantage; in the latter case, they only obtain the same as a chief engineer of the same standing.

651. What would be the half-pay of an inspector of machinery afloat when first promoted?—(*Mr. Wright.*) 16 shillings a-day is the half-pay. Formerly, before the Order in Council, it used to be the same as a chief engineer of the same standing.

652. (*The Chairman.*) Have you ever heard whether any chief engineers would decline their promotion to the rank of inspectors of machinery?—I have not heard that they would, but I have known several who have.

653. Do you know the reason of that?—The reason, I heard, was just simply that they did not consider the position and the ultimate attainment of pay sufficient to induce them to serve on for the number of years they would be compelled to serve.

654. Before getting their pension?—Yes.

655. Is the retiring pension of an inspector of

machinery higher than that of a chief engineer for the same service?—It is. Inspectors of machinery are allowed to count £10 per annum as retiring pension after being made inspectors.

656. Every year's service as an inspector adds £1 a-year to their retiring pension?—Yes.

657. (*Captain Dowell.*) What is it as a chief inspector?—The same.

658. (*Captain Commerell.*) The title of chief is merely honorary?—Yes.

659. (*Captain Dowell.*) What do you suggest, that the rank of chief inspector be abolished, or improved, pay given?—I am not prepared to say that it should be abolished, but at any rate, if the rank be retained at all, something additional ought to mark it in the service. I believe it is the only rank in the service that does not carry some substantial benefit with it.

660. (*Captain Commerell.*) In case of war, from what source would you draw the engineers?—I should think, under any circumstances, whether in time of war or in time of peace, as long as open examination is allowed to exist, open it not only to the dockyards, but open it also to the merchant service, and to the first class factories throughout the kingdom. I would let them all compete, and then you would get the best men into the service.

661. Supposing open competition were done away with, and it was competition by nomination?—There would be only the chance of getting them, as via getting other men, that is, by simply increasing the pay; nobody would be inclined to go to sea simply in time of war, and then to be immediately discharged in time of peace, unless he had some very great and substantial object in view; and there is nothing, I think, would give that but a great increase of pay. In our last war the straits to which we were reduced, and the description of men we were compelled to enter during the war, lowered the status of the engineers of the navy for 10 or 12 years.

662. (*Captain Dowell.*) Do you know at all where the mercantile marine recruit their engineers; what is the social position of the men?—The regular companies, such as the Royal Mail, the Peninsular and Oriental Company, the Cape Mail, Cunards, and all those royal mail lines have never any difficulty in the supply; they have steady pay, and their treatment of the men and system of messing and everything seems to give such satisfaction that they always have an ample supply from the various factories in the country.

663. Have you any idea as to what class socially those men belong?—They are chiefly, I think, the sons of the workmen who are employed in the various factories.

664. (*Captain Commerell.*) At what age do you consider that an engineer should be promoted to the rank of chief?—I should think he ought to be a chief engineer by the time he arrives at 30 years of age.

665. As the engine-room artificers are situated at present, do you find any difficulty in procuring competent men?—I have had no real difficulty, as I said just now; sometimes, when it has been more than usually difficult to obtain them, I have been obliged to sink a little the educational status in order to get them; but the worst point I find in their examination, as a general rule, is their want of knowledge of the steam-engine. A great number of them, although very good workmen, seem to really know nothing of the engine as a whole; they know nothing of the philosophy of the engine; they could tell you the names of the different parts of it, but scarcely any of them could tell their uses.

666. Should not you consider that might be owing to their never having served in large engine establishments?—A very great deal of it is necessarily owing to that; but I find very frequently that the best men come out of the smallest establishment, because they have had then an opportunity of going through the whole working of the steam-engine: one man has got the whole affair to fit up and see to during the time he is in the establishment; but at the larger manufacturing factories very frequently an ordinary workman is kept at

certain work, such as the vice or lathe, and although perfectly capable of using his tools to perfection he knows nothing at all really about the philosophy of the steam-engine; a man could tell you the name of a certain thing, but its use he would know nothing whatever about.

667. In your experience of engine-room artificers, should you say that the weak point, and the point they object to the most, is the messing arrangements, or not having sufficient pay?—Both their present pay and their non-increase of pay. I have not heard so much complaint about their actual messing, except in small ships, where their mess has been put along with the master-at-arms, and others, who have frequently objected to their being put there because sometimes they are not perhaps quite as clean and tidy as the master-at-arms and those with whom they are put to mess, who have got no such dirty duties to perform, if I may call them so, as the artificer himself, and of course they naturally complain that they should be messed together in a general way, and it has frequently been changed on board a ship after the messes have been fitted out.

668. Provided proper accommodation could be found on board ship, do you think that their present messing arrangements might be altered with satisfactory results?—Where there is a sufficient number amongst them to form a mess, I think that they would be better by themselves. The question would arise just as I said before about the menial duty and cleaning the mess and getting their things from the ship's coppers, and that sort of thing, which they must have to attend to themselves, or else have a difficulty in getting them.

669. (*Captain Dowell.*) Are you aware that in many vessels those difficulties are obviated?—I believe so, where commanding officers choose to make arrangements, but no arrangement is made in the service for it. I arrange it in the floating factory for them by simply detaching one of the second class stokers to attend and see those things done.

670. (*Captain Commerell.*) Has that second class stoker any other work?—No; the mess in that ship where there is such a number of them as 15 or 16 is quite enough for one man to attend to, so much so that I have had sometimes to add an additional one in order to see that things are kept in proper order.

671. That, to all intents and purposes, means that the engine-room artificers are supplied with a steward?—It is in a certain sense that although he is simply there to keep that part of the ship clean, and to see that the things are brought down to them; in the factory, where I keep them working as nearly as possible dockyard hours, I am obliged to submit to that, because it is a question of employing skilled or unskilled labour with them, and as skilled labour is the dearer of the two, to obtain it I prefer resorting to that system, as it removes that particular grievance of theirs.

672. (*Mr. Wright.*) If you had a much larger number of artificers in the Reserve than you have at present, could you, under existing arrangements, employ them profitably?—We could employ them if we could get the work to do, but I have been frequently without any work suitable for them. I have applied occasionally to the chief engineer at Chatham dockyard, and once or twice I have been met with the reply that there was scarcely work enough for their own men. The other day I applied, finding that I was getting short, and found that I could get some, which I set them about immediately. I have applied repeatedly for such things as I thought would be suitable for the men to do when I have had a number.

673. With regard to those artificers whom you employ on board the "Chasseur" working dockyard hours, do you think that they do as much work as good workmen would do in the dockyard?—I do not think that they do quite as much work. Although we are working as nearly as possible dockyard hours, we cannot quite do so, because when they go out they

must be clean and fit to go out; they cannot go out like the dockyard men, but they must be properly dressed, according to the regulations of the service, and sufficient time is allowed for that purpose, that is, for the purpose of cleaning and dressing when they go out and undressing when they come in.

674. Are they capable of doing that work?—As a general rule the men are quite capable of doing it.

675. If there were to be a large increase in the number of artificers in the service, would you propose having any other trades than the present trades of the artificers?—I have found a difficulty, especially with regard to the floating factory, in not having moulders.

676. I mean with regard to general purposes?—I think that the number of trades put down is very good for general purposes.

677. Could you tell me shortly what kind of educational examination you give the artificers?—I think I just detailed as nearly as possible how I take them. When they are brought in after an examination of their indentures or their certificates of service in factories, or whatever would give me an opportunity of judging whether they are fit and proper persons, then I ask them if they can read, and then I give them a piece of reading to do, such as the top of this paragraph here or anything that would be convenient. I hear their style of reading, and then I ask them if they can write, and I make them write from dictation and sign their names legibly afterwards; then I ask them what they can do in arithmetic; some of them can only do perhaps the first four rules, while some can go as far as decimals; that is about as far as any that I have had can go; some I have had pretty good at it and others again have been so far deficient that they could scarcely get through the first four rules. As a general rule I have wished to have men that could understand a vulgar fraction, that they might be able to enter lengths and breadths and notations from the barometer or hydrometer, or anything of that sort, that is, note it down when they had taken it. If they satisfy me, or very nearly satisfy me, upon those points, then I ask them their knowledge of the steam-engine. I just commence and ask them verbally as I would ask any other candidate to tell me the names of the various things on a boiler, and various things connected with a steam-engine, and ultimately ask their uses; then I have frequently finished up by asking them to trace for me the action of the steam through all the various valves and things until the water is either pumped overboard by the air pump or is returned into the boiler, the process in each case; from some of them I get very good and satisfactory answers, much better than from some of the young students, and from some the answers are very doubtful. In some cases, where I have known the men's workmanship and ability to be good, I have told them that they might keep their names on the list of candidates, and after a few months, when they had read and worked up their subject, they might come up again for examination; some do and some do not. At present I have a number of candidates on the list, but I cannot enter one, and very likely by the time that I can enter them they will be all gone.

678. You do not put them to any test with regard to their ability as workmen?—We cannot do that until they are entered. The first thing that is done when they are entered is to send them on board ship and get a uniform; that entails a little expense upon themselves; there is a certain amount allowed for it, but the amount is insufficient to get them the uniform, and then they are in debt to the paymaster, or rather to the Crown, immediately after entering, for a certain amount of their uniform; and, as a general rule, you must keep a man in the service until he has paid off the debt, whether he be a good or a bad man; that is the general rule, at any rate.

679. Can you say what general principle governs the selection for sea going ships; for instance, you have 15 engine-room artificers now in the reserve altogether. On what principle do you send them

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into ships?—As soon as possible, I send new entries to sea as I get a chance, in order that they may gain some experience, because at any time the ones who have already been to sea and gained their experience are available for any emergency that might arise. We might send them in charge of a gunboat altogether; and if that small fleet of gunboats at Portsmouth were sent out, I could send a couple of those men to take charge of the gunboats without any engineer at all. I have several men who are quite good enough for that, these I retain; I do it with regard to the roster, and it is, I think, acting according to sound judgment to send new entries to sea as soon as possible, in order to gain the necessary experience at sea.

680. (*The Chairman.*) I suppose, with some reference to their trades?—Yes, always; we do not send two of the same description of trade on board one vessel if we can avoid it, although sometimes we have to do so. In the event of doing that, I send a stoker mechanic, a different trade as far as possible. I send one or two stoker mechanics in every ship, as well as engine-room artificers.

681. (*Captain Dowell.*) If you have two boiler makers there is no objection, I suppose?—Of course, in the floating factory, as far as possible, I retain them at their own particular trade, when it is possible to do so, but the moment that happens to be overstocked, or there is not a sufficient amount of work for it, I employ them at any other thing that may be necessary, which gives them experience in the different branches of trade. I put a blacksmith to the fitting work, or a fitter to the forge, where I see that such a course may be attended with advantage.

682. (*Captain Commerell.*) In speaking of sending the engine-room artificers to sea, do not you think that arrangements could be made to have them pretty well on a roster?—Not very well; as far as possible we work with a roster, but, as I say, circumstances come in which necessitate my sending the fresh entries to sea as soon as they can possibly be sent; if I cannot do that, and if two men are to go, I send an experienced man and a new entry, if it be possible to do so, but in many cases I am compelled to send perhaps two men who have not been to sea at all.

683. Could you not obviate that by having a senior and junior roster; a senior roster of those who have been to sea, and a junior roster of those who have not been to sea?—I could do so if it were not my anxiety to increase the number of experienced men during the present time of peace, when we might require them for war services at any day, of course, then we should want the more experienced men immediately to send away.

684. We will say that there are ten engine-room artificers entered, you would send the man to sea you had entered first, would you not?—A man who had entered at first and a non-experienced man. If a man had been entered six months ago and had not yet

been to sea, then he would go, he would go before the man who was entered to-day.

685. (*The Chairman.*) Then you do keep fresh entries upon a roster?—Yes.

686. (*Captain Commerell.*) You do keep a roster in that way?—Yes, and I go as near as possible to the roster, except that there are five men selected for the staff of the floating factory, whom I do not change oftener than I am compelled to, and they are all of different trades. I keep one of each trade upon the staff, one fitter, one blacksmith, one boiler maker, one coppersmith, and one pattern maker; all of those men have been to sea with the exception of the pattern maker.

687. (*The Chairman.*) Do you communicate with other reserves with regard to the men whom you have as candidates for the situation of engine-room artificers, and that you cannot receive?—We have no communication, and have no authority to communicate at any time. I have very little private correspondence with the other reserves, but I have often thought it would be advantageous if the requirements of the reserves were communicated to each other. I might be short of supplies here, with supplies where abundant at Portsmouth or at Devonport. And again, I have had numbers on the list of candidates waiting to be examined, and by the time an opportunity approaches for me to be able to examine those men, the chances are that they are employed elsewhere, and I cannot get them.

688. How old were you when you were made chief engineer?—About 32 years of age.

689. I believe you said that as a rule you thought engine-room artificers were better workmen than the young engineers; would you be satisfied to have nothing but engine-room artificers in charge of your engine-room, or do you think it necessary that we should have a small body of well educated experienced men in the management of the engines, although they are not such good practical workmen as the others?—That is a question demanding some little consideration; I think still it would be necessary to have some number of educated men to take charge.

690. As officers in the engine-room?—Yes, as officers in the engine-room; still they must be men who are not only well educated but also able to handle their tools and direct every subordinate under them as to how they should proceed in the execution of any piece of work they may have to do; without that knowledge they would be left at the mercy of their subordinates at any time.

691. (*Captain Dowell.*) I understand you to say that they should be able absolutely to take the tools out of the hands of the other men and do the work themselves?—Yes, to be able to show them how to do it if necessary; I think it is quite compatible to have a thoroughly well educated gentleman, I may say, and a skilled workman at the same time; they must have done it themselves at one time as otherwise they cannot tell others how to do it.

(*The witness withdrew.*)

JOSEPH HARRISON ELLIS, Esq., R.N., called and examined.

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692. (*The Chairman.*) You are a chief engineer, I believe?—I am.

693. At present on half-pay?—Yes.

694. How long have you been on half-pay?—For 12 months.

695. What was the last ship in which you served?—The "Royal Alfred," in North America.

696. What complement of engineers had you in the engine-room?—Four besides myself, with two artificers.

697. What was her nominal horse-power?—800 horses, nominal.

698. What special duties did each of those

engineers perform?—The senior assistant kept a supervision over the entire work of the engine-room, under myself, and the others performed the necessary repairs about the engines, and the other work.

699. They kept watch?—Yes, they kept watch, and they did the work when in harbour.

700. Each one kept watch?—Yes.

701. Each one was in charge of the watch in the engine-room?—Yes.

702. Did the artificers keep watch at all?—The artificers kept watch in the stokehold, and I should say that the junior engineer, at times, when we were

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working at any speed, kept the stokehold watch as well; when working at anything like a moderate speed one engineer was considered to be sufficient to have charge of the watch.

703. Then the junior engineer kept watch in the stokehold, and the other engineers were in two watches?—There were six altogether, with the two artificers, forming three watches; the artificers and the junior engineer taking the stokehold, but occasionally when working expansively and everything was safe we used to allow the junior engineer to take charge of the watch and relieve the senior engineer from keeping watch at such times.

704. But the senior engineer sometimes kept watch?—Yes.

705. Who had charge of the cocks and valves in the ship's bottom?—I had charge of everything.

706. She was a wooden ship, I think?—Yes, she was.

707. Did you appoint any one specially to attend to the cocks and valves?—One engineer was appointed to attend to the sea-cocks, and he reported upon them once a-week to me; the chits that he brought to me were signed by himself and stated that he had worked them himself, and that they were all right.

708. What trades were the artificers?—One was a coppersmith and the other was a boiler maker.

709. Were they useful men who knew their work well?—The coppersmith was a very indifferent artificer, and of scarcely any use whatever, but the boiler-maker was one of the best men that I ever saw in the service as an artificer.

710. Did you find that he soon picked up a superficial knowledge of the engines and fittings of the boilers, which of course was not connected with his trade?—He very soon picked up a knowledge of all his duty in reference to the boilers, but I do not think that either of the artificers ever attempted anything with the engines.

711. Have you ever had anything to do with the examination of artificers on entering the service?—Never.

712. Are you aware what their qualifications are required to be?—Yes, to a certain extent; a certain amount of arithmetic and a knowledge of boilers I cannot repeat what it is, but I have seen the instructions. My own impression with regard to the matter of education on the part of the artificers is, that they ought not on entry to be expected to do more than read and write; they ought to give satisfactory proof of their ability to practise the trade they profess, and be able to read and write; artificers ought not to be expected to do more on entry, and all responsibility, I fancy, should rest with the engineer.

713. Would you not think it desirable that an understanding of the use and management of the various gauges and cocks should be required of them before they are confirmed within a year?—Before they are confirmed, within a year, they should understand practically how to manage the boiler. I would not go far into the engine management; that can hardly be expected, and would be sure to give rise to coaching up, and that sort of thing; but in the boiler-room they ought to have a thorough acquaintance with all the gauges and everything connected with the management of the stokehold under steam.

714. Would you consider it desirable in a large ship to allow the engine-room artificers occasionally to have charge of the stokehold?—Yes; with a competent engineer on watch in the engine-room. I have always allowed that.

715. Have you ever considered whether it would be advisable, looking to the state of the engineers' list, to reduce the number of engineers and increase the number of engine-room artificers?—Decidedly. I have always been of opinion that there is more than the needed number of engineers, and I have repeatedly expressed it. I could scarcely desire on board a ship like the "Royal Alfred," that there should be four

engineers, each of whom, no doubt, thought himself quite as capable of managing the machinery as myself.

716. Have you formed any acquaintance with other engine-room artificers besides those two in the "Royal Alfred"?—I have seen a great many at work on board other ships.

717. As chief engineer of the flagship on the North American Station, you were thrown in contact with them, I suppose?—Yes, very frequently.

718. As a rule, do you find the engine-room artificers better workmen than the young engineers in the service; by "better workmen" I mean manual workmen?—I think not. I have been fortunate in having good engineers so far as workmen are concerned; my own experience is, that the artificers have not been better workmen than the engineers. I have heard great complaints of the young engineers coming into the service, but I have never met with that serious difficulty in getting them to work, and without ability sufficient to do the work.

719. I suppose in that case you took the lead in those matters yourself?—I always supervised everything.

720. What advantage do you anticipate by reducing the number of engineers?—By reducing the number of engineers, one advantage would be that the work of the engine-room would be done more willingly by the artificers, and—

721. You mean, I presume, when you say "the work of the engine-room," the actual work of repair?—There is always a large amount of work required in an engine-room which the engineers feel a certain repugnance in performing, such as boiler repairs, repairs of pipes and joints in the bilges, and all work of that description; the engineer must feel a certain amount of repugnance in doing that sort of work which he knows can be done equally as well by simple artificers.

722. Do you consider, then, that it would be more reasonable to expect the engineer to superintend it instead of doing it himself?—Yes; but at the same time the idea ought to be guarded against, that the engineer need not to be able to do it. I consider it absolutely essential that the engineer should be capable of doing it when required; there may be emergencies when it is necessary that all the engineers should work quite as much as the artificers.

723. Are you satisfied with the training which the engineers now receive to prepare them for the service?—Scarcely.

724. In what respect are you dissatisfied with it?—I think that there is scarcely sufficient care taken in their practical training. I do not think that sufficient interest is taken in their progress as practical workmen.

725. Are you aware that in 1873, two years ago, a circular was issued, which appears to have made a considerable alteration in their practical training in the dockyards?—I am aware of that; but it is not sufficiently attended to. I do not think that these men have a sufficient interest in the class; that is, in the actual practical working of the engineers. I have opportunities of seeing and hearing that. I have two sons who are students, and I can see when I question them about their work that there is scarcely that amount of supervision exercised which, I think, ought to be exercised.

726. Do you think that arises from their being more highly educated than the men?—Not by any means. For myself I cannot see, and never could see, why any amount of education should prevent a man from acquiring the necessary practical skill in his profession; on the contrary, it ought to have the other effect, and to make him more desirous of becoming practically acquainted with all his duties; that is my own impression. I have often thought, when I have been in the dockyard, that it would be advisable if somebody connected with the navy were constantly supervising the progress of the students in their practical work; a chief engineer, for instance, or an inspector;

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that he should have the power of going about the dockyard and testing the students, indiscriminately as to their progress in their practical work, and that facilities should be given him for testing their progress in that respect.

727. As the inspector of machinery in the steam reserve has the examination of the students when they have completed their time, do not you think that the chief engineer of the dockyard might reasonably object to others going in and interfering with them, as he would consider, during their work?—I scarcely think, seeing that the chief engineer of the dockyard is a service engineer, that he ought to feel any objection whatever to the endeavour on the part of a brother officer to secure to the students a thorough acquaintance with their duties. It has to be borne in mind that the officer of the yard, the leading man, for instance, who is appointed by this circular, is not a leading man; and that, although his interest may not be opposed to that of the students, still he has no interest in their progress; whereas a naval engineer would have; and the naval engineer at the head of the department certainly ought not to feel any reluctance to allow a brother officer to test the progress of the students, seeing that he has so little to do with them himself. Indeed, I think that the amount of work which the dockyard chief engineer has, places him altogether out of the reach of the students, so far as attending to them personally is concerned.

728. Do you think that the artificers now in the service are likely to be contented to remain in the service under the present regulations?—I think that they are very discontented. I was saying that the artificer I had with me in the "Royal Alfred" was one of the best men I ever saw as a boiler maker; an industrious, skilful, trustworthy man, but he was constantly complaining to me of the service, and wishing that he could leave it.

729. What were the points of his complaint?—Principally his treatment on the lower deck.

730. By whom?—By the other petty officers.

731. Where did he mess?—In various places; he often came to me asking me to get him to mess alone. Sometimes he wanted to mess in the store-room by himself, where he did mess I could scarcely say, but I know that he was often coming to me and asking me to go to the commander and get him into some mess which had declined to take him in; the master-at-arms and other petty officers were not compelled to receive him, and they refused.

732. Did he complain of any other things, or of his pay?—That was the principal cause of complaint, the interference with him and the duties that he was called upon to perform upon the lower deck after leaving the engine-room.

733. What sort of duties?—Cleaning the mess that he was in, and so on. It has to be borne in mind that these artificers come from the factory, and most of them have wives, who have been accustomed to do all this kind of work for them.

734. They have never been at sea under discipline?—No; they have not been used to do the kind of work they are called on to perform outside the engine room, and when they have to go down upon their knees and scrub they do not like it at all.

735. Where is that man you speak of now?—I left him in the "Royal Alfred."

736. His grievances have not been sufficient to induce him to purchase his discharge?—He is a poor unfortunate fellow that has had too many difficulties to enable him to do that, but he would do it if he could.

737. Are they satisfied with their pay?—I think not.

738. Have you any recommendations to offer with regard to their pay?—They now begin at 5s., I think; they ought, in my opinion, to begin at 6s.

739. You would wish them to begin higher?—Yes; I think you would have a better supply and better men by beginning higher.

740. And after 10 years' service what would you

do?—After 10 years' service I would give them some promotion. I know myself that the artificers in the reserve at Portsmouth are beginning to talk about promotion, and I think it a great pity that there should be no prospect open to a skilled artisan. I think that there should be some kind of promotion for him, that is to say after ten years' service, a certain amount of which, say six years, should have been at sea, he should be promoted to a leading engine-room artificer, which would carry with it the rank of a warrant officer.

741. Have you considered what pay you would recommend?—I think as an artificer that the pay should continually increase to a certain maximum; from 6s. a-day by certain increments of pay every three years to a maximum of 7s. Then, as a leading engine-room artificer, commencing at 8s. a-day, and by similar increments reaching 10s. a-day.

742. (Captain Commerell.) Do I understand you rightly that you would make the pay 10s. a-day on entry for an engine-room artificer?—That would be for a leading engine-room artificer; after ten years' service as an artificer, a man should be promoted to a leading engine-room artificer, ranking with a warrant officer, and commencing with the pay of 8s. a-day, rising every three years afterwards to a maximum of 10s. a-day.

743. (The Chairman.) If you brought their pay up to 10s. a-day, would not that be giving them better pay than an engineer receives for the same length of service?—That is quite possible; but I think very strongly that the engineers are not properly paid; they are very inadequately paid.

744. What is an engineer's pay?—9s., rising to 10s. after five years' service, and there it stands.

745. What pay would you give them?—I think that the pay of an engineer ought to commence higher from the moment of entering the service. I think that is one of the causes why so many engineer students are desiring to leave the service; the pay is not sufficient to begin with; they can get better pay even if they remain in the factory.

746. What pay do they get now on first coming into the service?—I think now it is 6s. a-day; that is not the pay of a good mechanic in the very factory in which they have served their time.

747. They get 6s. a-day for seven days in the week and their food?—Yes.

748. That means 7s. a-day?—Yes, under ordinary circumstances.

749. Do you think that the engineer students, when they have served six years, could earn that pay in the dockyard?—Most of them could go into the drawing office.

750. If required; could they get 7s. a-day in the dockyard?—I think so, as draughtsmen.

751. Are you aware how much instruction in drawing they have had in that time?—Good students, not only in the matter of drawing but in every other thing they are supposed to know, have done a great deal outside the dockyard. I do know this, that if the only theoretical education they got was that which they received in the dockyard schools we should not have the same men that we have; they have to learn a great deal outside the dockyard, and to pay for it. It costs me something for schooling outside the dockyard, and I often inquire why it is not taught in the dockyard.

752. For drawing, do you mean?—Yes, but not only drawing, there are other things also. I am very much misinformed if it is not the case that the students sent a letter some months ago asking to be allowed more schooling; but, after all, it is not the amount of schooling but the amount of instruction they receive while at school. I have often inquired about chemistry, what are you doing in chemistry in the yard, and the answer has been "Nothing." Now, they should know a good deal about chemistry, I think. I do not know of any school in the world in which it would be so advisable to give payments by results as in the case of the students. It would give the schoolmasters

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Something like an inducement to attend to them better than they do now. Another thing which I think is exceedingly hard upon the students is this—I have had opportunities of seeing this, and speak from my own knowledge—of course they are kept to their work during the whole of the dockyard hours, and then, no matter how far off they live, and many live some distance from the yard, they have to go to school within an hour of leaving their work, and they are not provided with any means for shifting their clothing or for meals in the dockyard. I think it is very hard to have to walk perhaps two or three miles and then have no time to take anything, but only just time to shift their clothes and go back again to school. I think it is quite certain that if anybody interested in the matter went and saw the place provided for their accommodation in the way of cleaning, just a few pegs in the wall and two or three holes in a piece of board, and so on, it would be remedied.

753. The students receive six years' instruction in practical work and in schooling?—Yes.

754. Do their parents pay anything for that during the whole time?—To the government, no; but I do know this, that the work performed by the students during that time may be taken as a very fair equivalent for the instruction they receive, and it would be more so were there proper supervision exercised in improving their skill.

755. Surely for the work which they do they also get paid. Besides the instruction in practical work and teaching them a trade, and keeping them at school for six years, they get increasing pay year by year. Do you know of any other class in England that has the same advantages, or are there any private establishments in which they get that advantage?—Yes.

756. Where they receive instruction and are taught a trade for nothing?—I have never met with any trade at all in which the young students receive instruction, in addition to the pay they receive.

757. In any other position in England can they learn a trade and receive remuneration for it, without paying for it themselves in any way?—No, not for the instruction they receive.

758. Do not you think that the advantage of having six years' gratuitous instruction ought to be taken into account in the pay that they receive when they first join the service?—Yes, it ought to be taken into account. If a ledger account is kept, the work that they have done ought to be taken into account too.

759. Is not that work paid for?—Not sufficiently; everyone knows and the trades' unionist will tell you that one of the greatest complaints we have in all our manufactories is that the employers are in the habit of taking apprentices for the purpose of avoiding taking journeymen, the apprentices after two or three years being quite equal in value to any journeyman. Now, I think that is the case in the dockyard, that the students who have really attended to their work are worth as much as any journeymen after three years. I have been into the factory to look at the work which the students have done, and I have seen very good work indeed, work that any workman might well be proud of doing as a workman. I have been into Portsmouth dockyard within the last fortnight, and have asked to see work that my own son has been set about, and I have taken some pains to ask that he may be attended to if he shows a desire to be given work that will teach him something. I have seen the work, and I am sure if the students do work like that which I have seen, they are quite equal to any journeymen. That ought to be taken into account, and, I think, if more interest were taken in the students generally, it would be better.

760. Do you think that there would be more interest taken in the students if they paid for the instruction they received, or that the people who teach them would take more interest in their progress, or what do you suppose causes them not to take an interest in teaching the students?—Possibly it may be from inattention on the part of the students, which naturally breeds indifference on the part of the teacher,

especially in the case of a teacher who is not paid by results. It is a matter of little importance to him what progress is made, and if he finds that a student is careless he becomes so himself.

761. But if, as you say, the students' work is turned out so satisfactorily, does not that show that a great deal of pains is taken with him?—I do not know that they are all so. I have said myself that my own experience has not led me to discover such a great want of practical skill in the students, although I have heard of many complaints, but in the workshop as well as in the study a great deal depends upon the students themselves.

762. You have said that in your opinion the engineers are underpaid, what scale of pay would you suggest for them; that is in the case of both engineers, chief engineers, and inspectors of machinery?—The scale of pay which I think engineers should receive should commence with the students at 7s. 6d. a-day for the first three years, when they should become engineers, and should then receive 10s. a-day rising to a maximum of 14s. by an increase of 6d. a-day at stated periods; a chief engineer I would allow to commence at 15s. a-day, rising by an increase of 1s. a-day to a maximum of 25s.; an inspector of machinery should commence at 30s. a-day, and increase 1s. 6d. a-day to a maximum of 40s.

763. At what age do you think a man should be made a chief engineer?—I think it would be of benefit to the service if men were made chief engineers at 35 years of age.

764. (*Captain Dowell.*) Not earlier than 35?—Looking back to my own experience, I think that at 35 years of age a man is thoroughly competent to undertake the responsibility on board our ships.

765. (*The Chairman.*) Do you remember at what age you were made a chief engineer?—I think I was made a chief engineer at about 33 years of age. In looking at the age at which an engineer should be made chief, some regard must be paid to the possibility of it. I scarcely see my way, in looking at the lists as they are, or as it would be at all reasonable to propose they should be, to making them chief engineers even at 35 years of age.

766. Would you promote from engineers to chief engineers by selection or by seniority?—I think that seniority is the best, and it is the fairest.

767. That is, of course, supposing the man is qualified and fit for it?—Quite so.

768. If the engineer students now existing, of whom you have had some experience, and the assistant engineers and engineers, were allowed to leave the service at present on a scale of harbour-service pay, do you think that they would accept it?—That is an awkward question to answer. It is possible that a great many would, and I should fancy that the best men would be disposed to.

769. Would the engineer students leave, do you think?—Many of them would go, I should fancy, if you would allow them to. The means I would adopt to keep the students would be that they should, on becoming students, at once be appointed to a guard ship.

770. (*Captain Commerell.*) With or without pay?—They should be put on the books of a guard ship and wear a uniform, and their training should go on as now, but I would give them higher pay than they now receive. I would pay them the same as an assisting clerk. He gets the whole of his instruction at the expense of the government, the same as the students. I know three instances at least of assistant paymasters who failed at the examination for engineer students, and subsequently became assistant clerks, and actually got more pay at once than they would have received as students of several years standing.

771. (*Captain Dowell.*) Their promotion is very slow?—It is almost as slow as that of the others, but the position that they can rise to is better; the pay of a paymaster is considerably above that of an inspector of machinery. If it be a fact that the professional education of the students should be considered in their

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pay, then I say, ought not that of the assistant paymasters also to be considered?

772. (*The Chairman.*) If that be the case, how is it that we have so few applications for men to enter as clerks' assistant, and so many for men to enter as engineer students?—Because there are some difficulties put in the way in the one case. In the case of an engineer student you have only to go to the dockyard and say, "I want my son to be made a student," and it is done; but in the case of an assistant paymaster, there is some difficulty in getting a nomination. I think that the very fact of the students being able to come in in that way is detrimental to the engineers as a class, and goes against them, for they are looked upon as inferior people, and treated accordingly. I think myself, however, that it is a very significant fact, that youths who have failed in passing the test necessary to become an engineer student have immediately succeeded in getting an appointment as assistant clerks.

773. Is not what you say a natural consequence of open competition?—Yes, of course.

774. Where the standard must necessarily be much higher than in the case where nominations are given?—That system of open competition, applied solely to engineers, places them at a disadvantage throughout their career.

775. Do you approve of the system of open competition for the admission of engineer students?—I do; but at the same time I think that some better means should be adopted for ensuring an amount of respectability. There is none whatever now.

776. That would put an end to open competition?—I have thought the matter over, and I believe that open competition might be allowed. I have often thought, and indeed suggested, that in the case of engineers there should be some such school or college as that at Cooper's Hill for the Indian service. I cannot help thinking that if there were a school of that kind at Greenwich, into which youths should be entered by open competition, it would be a good thing. They should reside there for twelve months, during which time they should receive a special education, tending towards their future career as naval engineers, and their parents should be called upon to pay for that residence during that twelve months, say £100. Then they should go from that school into the service by competition again. They would either fail to pass out of that school into the service or they might succeed. That would be open competition; but the fact of having to pay for twelve months' residence in such a school would place a very fair restriction upon the indiscriminate entry of youths.

777. Do you think that the same object might be attained if the names and parentage of the candidates were submitted to the Admiralty, and a nomination were given by the Board of Admiralty for competition for admission into the dockyard?—Yes, that would answer the same purpose. I feel so strongly upon this matter, because of my experience in the service, and I look upon it that it places us at a woful disadvantage. The question is constantly put, "Where do they come from?"

778. (*Captain Commerell.*) Just look at that list (*handing a list to the witness*), and you will see where they come from?—I am not at all ignorant of this fact; I am quite aware of it. If and when that question has been put to me as an argument against doing anything for the engineers, I have only been compelled to admit it with a very great deal of regret.

779. (*Captain Dowell.*) With regard to what you said just now about the reduction of the number of engineers, have you considered at all the number necessary to meet the requirements of the service?—I have not had the means of getting at the official list of the number at present, but in going over the navy list I think that the service at present might be carried on with about 500 engineers. I think the number now is somewhere between 700 and 800.

780. (*Captain Commerell.*) Engineers, independent

of chief engineers?—I think that about 500 engineers and second-class assistant engineers would do.

781. It is now nearly four to one, and that would reduce it to something like three to one?—Yes.

782. (*Captain Dowell.*) Have you heard complaints amongst the engineers that their time as second class assistants does not count?—It is a very great source of complaint amongst them that their time does not count. I think, as engineers come into the service at the present day, it is a very great hardship. I take that all things are comparative in the service, but compared with other officers, I think theirs is the only time that does not count from the time of entry, from the time that they are 21.

783. I understand engineers never count the value of their time?—No matter how long the subsequent service is, they never do.

784. They do not count a portion of their time until they have been for 11 years chief engineer?—That is so.

785. Have you heard any dissatisfaction expressed by the engine-room artificers with regard to their uniform?—Never; but that is a subject to which I have not paid much attention.

786. What uniform did they wear in the "Royal Alfred"?—I always saw the artificer with a jacket with anchor buttons and a cap.

787. You never heard any remark about it?—No; no artificer has ever complained to me about it.

788. Where on Sunday at divisions, or on ordinary days at divisions, did these men muster?—With the stokers.

789. Had any executive officer any supervision over them in any way, as far as their instruction went?—On Sundays at divisions the stokers and engine-room artificers were inspected and reported by the junior engineer to the lieutenant of the division.

790. In whose charge were the clothes list and the slop list?—The engineer prepared the slop lists and supplied them to the lieutenant of the division.

791. On ordinary days, week days, where did the engine-room artificers muster for inspection?—I think they were generally at quarters; there were very seldom any inspections except at quarters.

792. I mean at quarters?—The artificers were in the engine-room. I have often thought on board the "Royal Alfred" that it was a great pity that the artificers and stokers could not be kept in something of the same way as the marines, that is, kept separately and messes separately; the artificers could be responsible for the cleanliness of the stokers' department and their own, just in the same way as the sergeants of marines are to the marine officer. If the engine-room artificers and stokers were messes like the marines, and were responsible to the engineer for the cleanliness of their department in the same way as the marines are for the barracks, then the engineer would have entire control of the steam staff, and there would be less likelihood of interference on the part of other petty officers with the artificers.

793. You say that your engine-room artificers and stokers in the "Royal Alfred" were, as far as the divisions were concerned, under a lieutenant?—Yes.

794. Is that the ordinary rule of the service, or was not it an exception in that case?—On reflection it occurs to me that I have made a mistake, the stokers were inspected and reported by the second senior engineer to the commanding officer; but in other ships that I have served in it has always been in that way; in reference to engine-room work, I do not know of any subject which creates so much trouble and disagreement on board ship as that of the position of the stokers.

795. (*Captain Commerell.*) Do you think that the present engine-room artificers are equal in mechanical skill to the average fitters in the dockyard?—I should say not, as a rule.

796. Do you know what is the pay of the present engine fitters in the dockyard?—I should think 5s. to 6s. a-day, perhaps 6s. a-day.

797. For how many days in the week?—For six days in the week.

798. You have acknowledged that you do not consider that the engine-room artificers are equal in mechanical skill to the engine fitters in the dockyard?—No, not as a rule, they are not.

799. And yet you propose an increase of pay very largely in excess of that which an engine fitter in the dockyard would receive; how do you reconcile that?—From this fact, that I can scarcely see what is a proper compensation for a man who leaves his home to go to sea and submit to that which he is called upon to submit on board ship; to a man who has lived at home till the age of 25, and is then called upon to go to sea and to submit to all its discomforts, I think that the extra pay suggested scarcely amounts to compensation.

800. On the whole do you consider that the engineer student is satisfactorily treated in the dockyard?—I do not.

801. In proposing the rate of pay for the chief engineers and engineers, have you made yourself acquainted with the pay of other officers in the different ranks, and does this increase of pay bear reference to the present rate of promotion, or to an accelerated rate?—It bears reference to their duties principally. The rate of pay that I suggested, of course, supposes that there will be under the most favorable circumstances a large number of officers who cannot be promoted, and that even the whole of them will be probably above 35 or close upon 40 years of age before they are promoted; if they are promoted earlier they do not arrive at the increase of pay which I suggest.

802. (*Captain Dowell.*) You suggested that they should commence with higher pay?—To commence at 10s.; 7s. 6d. the assistant engineers upon leaving the studentship.

803. (*Captain Commerell.*) An engineer should commence upon 10s. after three years' service as assistant engineer?—Yes.

804. Therefore he would get at the age of 24, 10s. a-day?—Yes; an assistant surgeon gets 10s. at 21 years of age, and a lieutenant gets 10s. a-day at 21 years of age, or perhaps at 19 years of age.

805. (*The Chairman.*) At 24, he is only a sub-lieutenant, and he gets 4s.?—I should be very glad, and I think the whole of the engineers in the service would be very glad to take the position of a lieutenant, and his pay, with his future prospects. I have always been told that a lieutenant comes in with 1s. a-day as a cadet, and he is content with that small pay because he has a chance of reaching a position that an engineer cannot dream of attaining. I propose to increase the pay of the junior ranks, because the students are so disposed to leave, as they can get more elsewhere than the service offers them.

806. (*Captain Commerell.*) Do you find that to be the case?—We do find that to be the case.

807. (*Captain Dowell.*) Do you know the relative pay of an ordinary merchant service engineer and one in our own service?—I think, upon the whole, that the engineers in the merchant service are paid better than the engineers in the navy, because, in addition to their pay, their expenses are less; indeed they are kept, and put to no expenses at all.

(*The witness withdrew.*)

JOHN HAROLD HEFFERNAN, Esq., R.N., called and examined.

814. (*The Chairman.*) You are a chief engineer in Her Majesty's service I believe?—Yes.

815. In what ship are you serving at present?—In the troopship "Crocodile."

816. How long have you been in charge of engines?—Since 1866.

808. In the Peninsular and Oriental Company's service the 5th engineer receives £120 a-year, that is about 6s. a-day, is it not?—Yes, but he has not the slightest expense in addition.

809. (*The Chairman.*) Is his mess found?—Yes, his linen and everything is found him, mess and everything; they go on board ship with the clothes they ordinarily wear and have no expense whatever; it makes a great difference getting the same pay, and everything found, and having to find a uniform and mess as in the navy.

810. (*Captain Commerell.*) But you must think, there are so many other extra things; just think of an engineer in the merchant service who is driving on from morning till night continually; in our service they lie in harbour for six or eight months at times?—I believe the amount of duty performed in the navy, the actual amount of valuable service rendered by the engineers in the navy, exceeds that in the mercantile marine. I think that a staff of engineers who will take a ship away from England for three or four years, and keep everything in proper repair for that time, render quite equivalent service to any engineers in the merchant service, whose machinery is put into perfect order everytime the ship comes home. Our engineers take their ships away, and are supposed to bring them back again in good order after four or five years, but merchant engineers do not do that, they come home after running a certain time, and get a good spell at home while the ship is being put in order for them.

811. (*Mr. Wright.*) If you reduced the number of engineers considerably what equivalent increase in the number of engine-room artificers do you consider would be sufficient for the requirements of the service?—I should propose, until the system is fairly in operation, having a surplus. I can see myself that one of the principal and most important objections to the introduction of a larger staff of engine-room artificers into a ship will arise on the part of the commanding officers, who do not like to trust to artificers; it will take some time before the executive officers will be willing to place any reliance upon artificers. I could not help being struck with that in the case of the court-martial on the "Vanguard," where it was said that the engine-room artificers who had been appointed for the purpose of closing the doors immediately went to that duty with only one engineer. Now if you reduce the staff of engineers, which I think you may legitimately do, it will very frequently happen that only one engineer will be available; the commanding officers will want engineers in every place, but they cannot get them. The objection will not come so much from the engineers as from the commanding officers, who feel more satisfaction in knowing that they have an engineer to do a trifling duty than in having to trust to an engine-room artificer.

812. If you were chief engineer of a first-class ironclad how many engineers would you wish to have?—I have not had much experience in these large ironclad ships.

813. At present there are nine engineers and four engine-room artificers in the "Devastation"?—I would immediately reduce that ship four engineers, that is, to five. I think five engineers would be abundant for the "Devastation."

817. What staff have you in the "Crocodile"?—Her sea-going staff is eight engineers and three engine-room artificers.

818. When you say "engineers" do you include assistant engineers?—Yes.

819. Are they first-class assistants?—They vary.

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820. Of what trades are the engine-room artificers?—One is a boilermaker, the other is a blacksmith, and the other a fitter.

821. What duties do your engineers perform. Begin at the senior one; what does he do?—The senior engineer has general duties under myself.

822. He does not keep watch?—No, he does not keep watch.

823. How many keep watch?—The remainder, there are seven as watch-keepers.

824. How many are there in each watch?—One in the engine-room and one in the stokehold watch.

825. Do the engine-room artificers keep watch at all?—One in the stokehold, and in any ship one is detached to assist the senior engineer about the ship with the watertight doors and general duties.

826. How many watches are there?—Four watches, they are put in four watches in the troop ships on account of the constant work that we have for six months. These men only come into the ship for six months, and a week after the end of the troop season they are taken from the ship.

827. Did you say that one was told off to attend to the watertight doors?—Yes; one of the engine-room artificers with the senior engineer; the general duties of the ship I speak of.

828. You do not excuse an engineer for that purpose?—Not for that duty. The engineers are stationed in the event of any casualty occurring with particular doors and pumps, and so on.

829. I suppose from your peculiar service in the "Crocodile," your engineers and your engine-room artificers have not got so much to do with the repairs of the engines as they have in an ordinary man-of-war?—No.

830. You are in the hands of the dockyard authorities?—Yes, at this end. I have not been a run in the "Crocodile" yet. I have only recently joined her. I have been in the "Spartan," but from what I glean, all the minor defects are performed by the engineers during the trooping season. I was paid off from the "Spartan" in July.

831. What was her horse-power?—350 horses, nominal.

832. Had you any engine-room artificers in the "Spartan"?—Yes; two.

833. And how many engineers?—Two engineers.

834. Did you ever allow the engine-room artificers to have charge of the engine-room?—Yes; I was compelled to do so when I found that I could trust them; but I had to train them to it.

835. After being trained, were you satisfied with the way in which they did it?—I gave them both a certificate in accordance with the circular that they were capable of keeping a watch, that is, after breaking them into it in my own engine-room.

836. I asked you just now if the engine-room artificers took charge of the engines satisfactorily; was there anything special in the engines of the "Spartan," which made it require more than usual care?—Yes, they were very troublesome, they were compound engines of a peculiar type, and very troublesome to manage.

837. What is your standing as a chief engineer?—7½ years. I was promoted in February, 1868.

838. At about what age were you promoted to the rank of chief engineer?—I was between 35 and 36 years of age.

839. (Mr. Wright.) Were you promoted before your turn?—Yes. I must qualify what I said by stating that I was promoted out of my turn.

840. (The Chairman.) For what?—I belonged to the "Waterwitch," and the captain thought that I helped to save the ship. I do not know that I did anything very extraordinary. I simply did my duty.

841. Looking at the engineers' list, and the time that they are on it as a rule before they are promoted to the rank of chief engineer, do you think that the flow of promotion is satisfactory?—No, I do not, for the engineers.

842. You would for the good of the service like to see it improved?—I am satisfied that it would be for the good of the service if the men were promoted earlier to the rank of chief engineer.

843. To manage that, what plan would you propose?—I only see one way of managing it, speaking generally; in my opinion to get a quicker flow of promotion you must certainly reduce the number of juniors, and give more employment for the chief engineers.

844. By juniors you mean the engineers and assistants?—Yes, I am speaking of the matter now comparatively. Take the surgeons on the list, I am speaking of years ago, when junior surgeons and seniors were equal; now it takes them 13 or 14 years to get one step in promotion, therefore, with engineers, where the proportion is 170 to 800, it takes considerably longer; some few years ago the chief engineers' list was very much larger than now.

845. You would increase the number of chief engineers?—Yes, provided you can find employment for them; of course, I am now speaking under correction, and do not presume to give a definite opinion, but I think I speak correctly when I say that before the compound engines were introduced into the service, chief engineers were carried in ships which developed a certain amount of power, perhaps 700 to 800 horse-power; now, I doubt very much if you searched the navy list through, if you could find one ship that was not developing something about 1,500 horse-power, because the nominal horse-power is quite a myth as far as the employment of chief engineers is concerned. The Admiralty order is, that no chief engineer should be carried in a ship of under 200 horse-power nominal; now, we get ships with double the power, and the result is, because the Admiralty stick to the appointment of engineers according to the nominal horse-power, that, therefore, the employment is reduced for chief engineers, and they get the work done by engineers.

846. If you reduce the number of engineers, what should you propose to fill their places?—I should propose a larger number of engine-room artificers. I must confess that my experience of them in the "Spartan" was very favourable, fortunately I had very good men as artificers, remarkably good men.

847. Looking simply to their qualifications as practical workmen, and their ability in turning out a good job of work, which do you think does the work the better, a young engineer, or an engine-room artificer?—I should say that the engine-room artificer is generally the better workman, but my experience as far as engine-room artificers are concerned is limited to the "Spartan."

848. What proportion of engineers and engine-room artificers on your reduced scale would you think sufficient for the "Crocodile," you have now eight and three?—I think if I were keeping the ship running, the same as a commissioned ship, I should prefer to run that vessel with five engineers and from six to seven artificers of various trades.

849. You have now got 11 altogether?—Yes, I would have about the same number.

850. Do you think it would be a satisfactory arrangement to put an intelligent engine-room artificer in charge of the double bottoms and water-tight bulkheads under the chief engineer?—No, I would certainly give that to an engineer.

851. Would you excuse him from watch keeping?—It would depend very much on the size of the ship; if you speak of the "Crocodile," the duties in that ship are so varied, in comparison with those in a man-of-war, that you must excuse one senior engineer for duty with me; his duties are to me the same as the first lieutenant's duties are to the captain.

852. Would you give him charge of the water-tight bulkheads?—Yes, under myself; that is the arrangement I have now. I have stations the same as fire stations, so that every engineer knows what to do, and the superintending and keeping clean is done under the direct responsibility of the senior engineer.

853. (*Captain Dowell.*) Who does other duties besides?—Yes.

854. (*The Chairman.*) As you would desire to see some of the engineers replaced by engine-room artificers, would you think it satisfactory if the whole were replaced by engine-room artificers?—No, decidedly not.

855. Do you consider that the actual manual work in the repair of engines, the fitter's work that the engineers do, is the most important part of their duty?—I do not think so, and I have never found it to be so.

856. Under any circumstances you think that you should have a body of officers in the engine-room for the management of the stokers and engines?—Yes.

857. By "officers" I mean well educated gentlemen with a good knowledge of their duty?—Yes, I think so; that is my opinion, particularly in the naval service where, of course, it is necessary for discipline to be carried out, and if a man is not in a position to command, he is not in a position to be obeyed.

858. In the troop ships, where do the engineers mess?—They mess by themselves.

859. The junior engineers?—Yes.

860. Who messes in the saloon?—I do myself, as chief engineer.

861. No other engineers?—No, only myself.

862. Are you satisfied or pleased with the mode of entry of engineer students into the service now, or do you know what it is?—Yes, and I think it is a very objectionable thing myself. I perhaps speak with some prejudice in not having been one myself, still I think it is objectionable.

863. Why do you think it is objectionable?—Because they are drawn simply from a naval port, and are generally crammed with what they have to go through in the early period of entry. I do not know the source whence they come.

864. Just look at that list (*handing a list to the witness*)?—Personally, I have no fault to find with them, but as a father of boys, I certainly should not bring up my own sons as engineers unless they had a better prospect held out to them.

865. (*Captain Dowell.*) Did you anticipate that was the class from which they were drawn?—No, I did not. I have heard since I have been in England that it was becoming very bad, and that there was no check upon the entries.

866. (*The Chairman.*) Do you suppose, if the nominations were retained in the hands of the Admiralty, and that they were selected by an examination after that, and the prospects of the engineers were improved by reducing the number of engineers, and therefore quickening promotion, that men in a higher class of society would put their sons into the engineer service?—I should think it would materially assist to that end. I think that the position of engineer, considering the standing that a chief engineer gets, and the standing that an engineer gets, although not perhaps recognised in the service, ought to be as much a source of emulation for a man to get his son into, to become a naval officer, as is the case in any other line; but that does not stand good outside. I find many of my brother officers ambitious to get their sons into the navy in their own line. A man does not feel that his son ought not to become a paymaster, but I feel that mine ought not to become an engineer under the present regulations.

867. Is that feeling caused by seeing the class of men with whom he has to associate?—That is so to some extent.

868. Where did you serve your time?—In London, in Long Acre, in Messrs. Holt's office. When I was an apprentice boy I had to work from 6 o'clock in the morning till 8 o'clock at night.

869. Have you any suggestions to offer as to an improvement in the pay of the different classes of engineers?—I could not give a scale of pay because I have never thought over the subject; but I think if the engineers were obtained from other sources

they would be worth more than the 6s. a-day at which they are started now.

870. I suppose if quicker promotion were given it would be a great boon?—Yes, it would be an incentive if there were a probability of a man getting beyond a certain dead level.

871. Do you think that the pay of the engine-room artificers is satisfactory or is sufficient to retain them in the service after they have completed their 10 years?—I should think that would be doubtful, but I have had no experience of it.

872. Have you any knowledge of the pay given to men of their qualifications in the private trade?—Their pay ranges from 6s. a-day to 40s. or 42s. a-week perhaps, and then in their shops they have opportunities of making overtime.

873. From your experience of the engine-room artificers, what do you think would be proper compensation to a man who has been receiving 6s. a-day for six days in the week in the private trade, what in the way of pay do you think would induce him to go to sea as an engine-room artificer?—I think the general ruling inducement with those men, with whom I have come in contact, has been the pension. That seems the ruling principle with them, so far as I know, at present.

874. The great point with them is the getting away in 20 years' time?—Yes.

875. You think that after the completion of their 10 years the prospect of a pension in another 10 years would be a considerable inducement for them to remain in the service?—Yes, if they had an increase of pay, perhaps for the next 10 years, those men find out their own value after a few years, and take their labour into a market where it is better paid, that is to say, if they are any good at all.

876. (*Captain Dowell.*) Had you any difficulty in the "Spartan," with regard to the messing of the engine-room artificers?—Yes, I had a great deal of trouble in the early part of the commission.

877. What was the difficulty, and how did you arrange about it?—When the original circular came out, there was a place allotted them to mess with the chief petty officers (it is not stated in the instructions), and they were put in with the first class petty officers; unfortunately we had a black quarter-master who objected to the engine-room artificers messing with him, that was the first trouble; you must remember that those men were perfectly strange to the customs of the service, and I suppose that quarrels took place.

878. How was it settled?—It was taken on the quarter-deck to the captain, and I think it was shelved for a time; then the men came to me and, of course it being a question of discipline, I felt rather diffident about interfering, as it was not in my province at all; however I took an opportunity of speaking to the captain and referred to the circular, but was not in a position to prove my statement. There were the elements on board the ship to make a chief petty officer's mess, for we had a ship's steward, and subsequently it took place, and there was a chief petty officers' mess. The captain entered into the spirit of the thing, after he saw that the men were of some value to me, and he allotted them a boy as a servant. I complained to him that I could not keep the machinery running. I said that the men came to me and complained that they had to clean the mess, and do this thing and that. I made no difficulty, but I said, Captain, I must do so and so, and he being satisfied that I was not taking any advantage, said, "I see it must be so," and then he allowed a boy to wait upon them, and there was a chief petty officers' mess formed.

879. Did they ever express any feeling as regards their uniform?—Not to me, never.

880. At divisions mustering, and that sort of thing, what position did they take in the ship; where were they mustered?—In the "Spartan" the petty officers were mustered with the stokers, in front of them.

881. Who inspected them?—The lieutenant of the division.

882. The engine-room artificers mustered in front

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of the stokers?—Yes, they stood in front with the other petty officers, facing them.

883. (*Captain Commerell.*) Did you hear of any other objection that the engine-room artificers had to the service generally?—I think the principal objection or complaint that I heard on the station once or twice, was with regard to the provision for messing, and that they had to do general duties that were foreign to them, such as cleaning the mess, and scrubbing their hammocks, and so on, and with their own duties it is very difficult for them to do those things; in point of fact they cannot do their own duties and that too. I could not have kept my ship running for four years as I did, unless I had had good men, and men able to do their work. I had those men often employed both night and day, but I had a very good captain, who saw that the men were useful to me, and he granted certain privileges; it was Captain Carter.

884. Have you made yourself acquainted with the education given to the engineer students in the dockyard?—Not much.

885. In a practical way, should you think that their education was a satisfactory one?—Of course, they come into the service with a practical certificate, but what I am surprised at is how much their physique has deteriorated; putting it broadly, you do not see a man amongst them. I remember Captain Williams saying to me many years ago, and it was true, "What a fine lot of fellows the engineers are." I think we were then, but I cannot say that now, for I do not think that many of them could stand a hard day's work.

886. To what do you ascribe that want of physique?—To the amount of study which they have to get through, which, with their practical work, will not admit of their physical development.

887. Do you think that the medical examination of them, when entered as students, is not sufficiently severe?—I cannot speak definitely upon that point. I speak simply from results as they come into the service now; physically speaking, there is not a man amongst them; there may perhaps be a few exceptions, but my experience of them for the last few years is, that they are a physically inferior race of men to the others. I am not speaking about their intellect. I have no doubt they possess fine intellects, but it is a question whether you do not want something more than that, and whether we may not have overdone that part. I do not pretend to give definite opinions upon those points, because I have not thought about it.

888. In proposing to reduce the number of engineers, what source would you look to for officering our ships in case of war?—Before answering that question I may say, speaking of the students, that I think, if the Government or the Admiralty believe it to be a good plan to still educate their students, and if they are of that value practically that theoretically they are, it might be made open to competition still, and I do not see, myself, why we should not get a mixture of outsiders; the entry should be competitive.

889. (*The Chairman.*) Into the service, not into the dockyard?—That is competitive, I understood. I think that might tend perhaps to put them on their mettle.

890. (*Captain Commerell.*) You do not like, as at present, that the engineers should be restricted to engineer students?—No.

891. But you would throw it open to the large factories?—Yes.

892. Do you think that you could get, with the present regulations, really thoroughly good young men from the outside factories to compete?—Not at the present rate of pay; nor do I think that you would get them to pass such a high standard as I understand the students pass now.

893. What would you consider to be fair pay for an engineer on first promotion to that rank after he has gone through the time of an assistant?—I think, myself, that we might abolish one of the ranks of

assistant engineers altogether. I do not, myself, see any difference between a first and a second assistant.

894. On entry from the dockyard, or a private yard, to become an assistant engineer, what pay would you give them?—I think that with some prospect of promotion, 7s. 6d. a-day is as little as you can give a man, considering that you give an artificer 5s. 9d.

895. But one is promoted to the rank of engineer in three years, which would raise his pay too?—I have never gone into that question and could not give an opinion upon it. I have never thought over it at all.

896. (*Mr. Wright.*) You were senior engineer of the "Warrior" at one time, I believe?—Yes.

897. Was that when she had two chief engineers?—Yes.

898. It was reported that the system did not work well; have you any reason to assign for its not working well on a large ship like the "Warrior" with two chief engineers. From both having the same title?—I cannot give an answer to that question, but I should not like to give a divided responsibility. The duties of chief engineers are defined by the instructions as being equal, and unless you give the position entirely to one man, with a different title, I do not think it would work well; if that be done, then I see no reason why it should not work well. I thought the other day, when seeing the "Thunderer," that it was very necessary where there are so many engines. I am satisfied that I could not do my work efficiently, and that one could not do it.

899. Have you had any time on half-pay as a young chief engineer?—No, I have been very lucky.

900. Have you anything to say with reference to the amount of half-pay, whether you think it is sufficient or not?—I can speak upon the principle; I think that the half-pay of an engineer when promoted to the rank of chief is too small.

901. (*The Chairman.*) What is it?—6s. a-day. I can illustrate that by the case of an engineer who was contemporary with myself, and who, from no fault of his own, but from want of promotion was 42 or 43 years of age when he was promoted, and he gets 6s. a-day half-pay; perhaps he will have to remain for a year on that, so that you are actually punishing a man by promotion.

902. What is your full pay?—15s. a-day now. We have a scale, and our time does not count for us in that way. Speaking upon the question of the engineers, a thought occurred to me in the train, when coming up, which has often suggested itself to me when abroad. It was this, that when engineers are in charge of a ship, you should give them the rank of engineers in charge, in the same way as assistant paymasters in charge, so as to define their position more, and give them the privilege, which is possessed by officers of equal rank, of going into the ward-room.

903. The practice is for the engineers in charge to go into the ward-room?—The practice is, but in many of the small ships on the West Indian station it was a great detriment to the engineer not having his position defined by being a ward-room officer. It occurred to me in the "Waterwitch." I was promoted in that vessel, and my cabin was in the ward-room, but I had to go into the ward-room on sufferance. My captain told me he would not have me there. I said, "Well, Sir, the engineer's mess is on the lower deck; but I cannot, as the engineer in charge of this ship, with a cabin in the ward-room, go forward on the lower deck"; and I made it a matter of reference to the commodore, and had it settled. Now, if it had been a lieutenant-commander's command, I should have gone there as a right.

904. Have you any suggestions to offer beyond what you have told us on the subject of the engineers and the engine-room artificers?—I think that those men may be given an increase of pay from 5s. 9d., so that after a certain number of years' service they should have an incentive to conduct themselves well; and I think that they ought not to be second, so far as their position as chief petty officers is concerned, to

any one; they ought to be equal to the master-at-arms. They complain that they are below the chief boatswain's mate in that list of seniority and relative rank. They are No. 12 on the list; and those things affect men in the service so much.

905. (*Captain Dowell.*) It is not possible that they and the chief boatswain's mate can clash in their duties?—No; but they consider themselves put down, in being No. 12. The question is, whether it would be advisable to give them relative rank at all, or whether relative rank is of any use to them. I would simply put them as chief petty officers, and give them a frock coat. It would cost a little more to buy it, perhaps, but that would not so much matter. My impression is that they would get on better without relative rank. If you give them a higher rank, they will endeavour to do their work and forget what they are; the name of engine-room artificer denotes what they are. There is a question about them which would be a satisfactory question settled, I am sure, and that is the question of their leave. It did not occur much in my ship, but in many ships the work of these men keeps them on

board during the day, and often at other times when leave is being given. Now, I think that as those men are different to the other men in the ship, that they should have the privilege through the captain, as a question of discipline always is, of having leave given to them different to the ordinary run of leave. I have seen that, and known it to be the case.

906. (*The Chairman.*) The chief petty officers get it?—Yes; in large ships that is done, but in small ships, unless things are very much defined, they do not get it. With regard to the engineers, I think it is a hardship for the engineers in general that their junior time is not allowed to count. When I was third assistant engineer I ranked with the second master, and then I got on to second assistant under the old scale; but when the rank of third assistant was abolished, then the rank of a second assistant engineer was only made that of a midshipman. The engineers who came in as second assistants have no grievance, but I myself, coming in as a third assistant, and ranking with the second master, have a grievance, because that time is taken from me.

John H. Heffernan, Esq., R.N.
13 Oct., 1875.

(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

THURSDAY, 14TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.O.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B.

JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

Chief Engineer, J. W. KING, called and examined.

907. (*The Chairman.*) You are a chief engineer in the United States Navy, I believe?—I am.

908. What position are you now holding?—That of general inspector of naval engineering works.

909. Would you be kind enough to give the Committee an outline of the regulations for the entry and training of engineer officers in the United States Navy?—The regulations for the admission into the academy; all the engineers of our navy are at present, with very few exceptions, graduated in the naval academy. Here are the regulations for their admission into the academy (*handing a pamphlet to the Chairman*).

910. Are all the engineers in the navy now educated as cadet engineers, or do you admit them from any other source?—With few exceptions they are all graduated at the academy; the purpose is to graduate all at the academy hereafter. The reason why a few are admitted from outside is because the numbers required could not be filled up from the academy. The school for the engineers has only been recently established there; about five years.

911. Do the cadet engineers all enter as such, or are they selected from the cadets already in the academy?—They enter as such.

912. Between the ages of 16 and 20, I think it is?—You will find it here in the regulations; I think that is the age, between 16 and 20.

913. What course of practical training have they besides that which is laid down for the training in the academy?—They go through all the scholarships in the academy with the cadet midshipmen, except that of the drills and navigation; and in addition

they have a steam building, with some workshops attached, where they learn the use of tools, and so forth. After serving four years they go to sea for two years before being promoted to assistant engineers, having to undergo examinations, not only at the academy but after serving two years at sea, before being promoted to the rank of assistant engineers.

914. What are they called then?—They are called cadet engineers.

915. Still?—Yes; these are cadet engineers at the school (*referring to the pamphlet*).

916. I observe that they are called upon to sign articles that they will serve in the United States Navy for six years?—Yes.

917. That is from the time of their appointment as assistant engineers?—Yes.

918. How do you bind them; by the payment of a bond, or how?—Only by their honor.

919. Are there any cases of men wishing to leave during that six years?—We have not yet reached that point; it is not six years since the first graduates came out of the academy.

920. But you do not think it necessary to bind them by the payment of any sum of money?—No, I do not think that could be done in our service.

921. It has not been done at all events?—No.

922. Have they a working engine and boiler at the academy?—Yes, and also a marine engine and boiler, which they can operate with a propeller attached.

923. After the completion of two years at sea, I understand they are made assistant engineers, and they then come under the regulations established for

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Chf. Engineer, engineers in the United States Navy?—That is so, subject to examination.
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14 Oct., 1875. 924. Can you inform the Committee what examination they have in their practical work; I am not speaking of their educational work, but the practical work as fitters, or practical engineers?—They are examined by a board of chief engineers, consisting of three, who examine them in the same way as if they were going to examine for admission, asking them all practical questions about the operation of machinery, and all that a practical engineer would be required to know usually, and in all emergencies, on board ship; also when advanced to higher promotion they are examined in construction, and when they come for promotion to chief engineer the examination is mostly design and construction.

925. Do you look to your engineers afloat for the repair of engines afloat, or have you a body of mechanics to assist them?—On board the ships the engineers have to superintend the work always.

926. Or the repair?—Yes, on board ship. The artificers are to do the labour, or manual work, but of course there are occasions when they must even abroad go to the workshops on shore.

927. These regulations about the admission of cadet engineers have only been established during the last few years, have they?—Those regulations have only been established a few years; that is a late edition, there were others previous to that.

928. (*Captain Commerell.*) They were just beginning it when I was there?—Yes, that paper was issued in 1874.

929. (*The Chairman.*) We may take these regulations as embodying what is now believed to be the best system?—Yes.

930. Have you any idea, or can you inform us, of the complements of engineers and artificers on board your largest ships, at the same time specifying their horse power?—The largest ships we have do not carry more than three, one chief engineer and two assistants; there are probably exceptions where they carry three assistants, that is one chief engineer and three assistants, but that is the extent of the number on board. The smallest vessels have only one, the engines being operated by the artificers.

931. In the larger ships, where you have three or perhaps four engineers, what number of artificers have you?—From three to five.

932. What trades are they?—Machinists, called by you fitters, boilermakers and coppersmiths.

933. Are those men entirely under the control of the chief engineer and forming part of his department?—They are.

934. Is not the coppersmith under the carpenter?—No; all belong to the engineer force.

935. You have iron ships in your navy divided into compartments, have you not?—We have what we call monitors.

936. In your ships, divided into compartments, who has charge of the water-tight doors and sluice valves, and those portions of the ship connected with the compartments?—All connected with engines and boilers is under the engineer department, all forward or aft of that, it is the carpenter's work.

937. Do you, as a rule, repair your engines in government yards, or in private factories?—In government yards.

938. Do you construct your own engines in government yards?—In some cases.

939. Do your naval engineers ever do any duty in those manufactories; the government factories?—They do all the duty.

940. When waiting orders, is that?—When in the government factories they are on duty, not waiting.

941. What you call shore duty?—Yes.

942. Do they do the work in the fitting shops?—The chief engineer of the yard has charge of all the work. He has assistants and foremen for the different branches, and the whole of the work is done under his supervision; machinery is constructed and repaired under his supervision.

943. I understand that your manufacturing departments, so called in your government yards, are entirely under the naval engineer?—Entirely.

944. Have you no civil class of engineers in the government yards?—We have civil engineers in charge of the docks and wharves and buildings in the yards, one for each dockyard.

945. They do not belong to the corps of naval engineers?—No, they do not belong to the corps of naval engineers; they are appointed from civil life, and their profession is civil engineering.

946. In your large ships is there always an engineer in charge of the engine-room?—There is always an engineer in charge, if sufficient in number on board for that purpose.

947. Where do the engineers mess?—In the ward-room, all of them.

948. Is there the same care in the selection of cadet engineers as in that of naval cadets or cadet midshipmen?—The difference is this. In the selection of cadet midshipmen, each member of congress, of the lower house, or house of representatives, nominates from his district a cadet midshipman for the school, who, if he passes, is appointed. In the selection of candidates for cadet engineers the class to be filled is open to competition, and it is filled in the following named manner. The secretary of the navy issues permits, say to some 50 or 60 boys, residents of different localities, all of whom must present satisfactory evidence of good character and proper attainments. They are then examined, first by the medical officers in like manner with those to be cadet midshipmen, and after that by the board, according to the regulations now before you. From those examined the number required are taken; the number allowed by law is 30 each year.

949. Therefore you may say that the cadet engineers are nominated as candidates for competition by the secretary to the navy?—Yes.

950. In the case of cadet midshipmen I imagine that a large number is rejected in the course of four years' training?—That is the case; it is the case also that they are rejected very frequently at the commencement, and then a member of congress may appoint another.

951. Is there any limit or any line drawn as to the social class from which he is taken?—In neither case is there.

952. Have you had sufficient experience of the cadet engineers to say that a large number of them are rejected during their four years' training?—Yes.

953. Can you say what proportion?—I am not prepared to answer what proportion.

954. But it is really a large number?—Yes.

955. In the cadet midshipmen does it come to 40 or 50 per cent.?—Not so large as that, I think.

956. Is the medical examination or the physical requirements the same for the cadet engineers as for the midshipmen?—Yes, precisely; that is a copy of the regulations (*handing another pamphlet to the Chairman*).

957. Is there the same examination for cadet engineers at 16 as at 20?—Yes.

958. They compete irrespective of age?—Yes.

959. So long as they are within the limits?—Yes.

960. Are you, in your own opinion, satisfied that the present system will give you a satisfactory body of engineers?—I am quite satisfied that it will give us a superior class of engineer officers. We have been for 30 years endeavouring to raise the standard of ability, and have gone on increasing it until we have found it is impossible to get them from outside any longer; we were obliged to resort to the system of educating them by the government. It was necessary for our service to have men of ability and education, they could not expect to have rank and pay without it, and this course is intended to give everything desired.

961. You do not consider it a necessity that an engineer officer in the navy should be able to perform the manual work as well as an artificer, so long as he

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is capable of superintending it and seeing that the work is properly performed. Is that the case?—We consider it better that he should be able to do it with his own hands, if necessary, in emergencies, but that would not reject him if able to give the proper instructions.

962. You enter, you say, 30 a year, is not that many more than the requirements of the service need?—That is what the law allows, but it does not follow that 30 are always appointed. That will be left to the discretion of the secretary to the navy.

963. Are you sure that there are as many applications as are required, or is there any want of candidates?—Not now, since the system has become well known.

964. What are the relative prospects of cadet midshipmen and cadet engineers? What is the advantage in pay for an equal length of service?—This (*referring to a pamphlet*) will show the pay of all officers in the navy. You will see that the engineer officers, medical and pay officers of the same grades have precisely the same pay and the same rank. The rank of these several officers, called staff officers, is precisely the same as that of the line officers, except as to command.

965. Even in the highest grades?—Yes, here is the law of congress, on the subject, which was passed on the 4th March, 1871 (*producing another pamphlet and handing the same to the Chairman*). Previous to this law being passed there was a great deal of bad blood and ill feeling throughout the whole navy, in every ship and dockyard. That went on for a long time, when at last it came before congress, and was discussed fully by all parties, which resulted in this Bill, which, if you desire, your secretary can read. (*The secretary then read the following passage from the Act referred to*):—"And the officers of the staff corps of the navy shall take precedence in their several corps, and in their several grades, and with officers of the line with whom they hold relative rank, according to length of service in the navy; provided that in estimating length of service, for this purpose, the several officers of the staff corps shall, respectively, take precedence in their several grades, and with those officers of the line of the navy with whom they hold relative rank, who have been in the naval service six years longer than such officers of said staff corps have been in said service; and provided, further, that in estimating such length of service, officers who have been advanced, or lost numbers on the navy register, shall be considered as having gained, or lost, length of service accordingly."—"That commanding officers of vessels of war, and of naval stations, shall take precedence over all officers placed under their command."

966. That is to say, officers in command?—Yes.

967. The commanding officer for the time being takes precedence of everybody?—Yes. Then this follows: "And in processions on shore, on courts-martial, summary courts, courts of enquiry, boards of survey, and all other boards, line and staff officers shall take precedence according to rank." That is out of ship or out of station; and this rank gives every privilege to the staff officer, no matter whether engineer, medical, or pay officer, precisely the same privilege that a line officer of the same rank has. It was here where the whole trouble existed with us, and we had no peace until that rank question was settled.

968. Had you previously experienced difficulty in getting satisfactory engineer officers for the navy?—Yes, great; but still greater to retain them.

969. Where did you generally get them from?—From the engine factories and commercial vessels, after studying for the navy.

970. Did those officers mess in the ward-room?—Not the assistants, in former days.

971. Where did they mess?—They had a separate mess called the engineers' mess.

972. How long has that been abolished?—About the year 1869.

973. When the change was made, what course was adopted with the engineers then in the service who had been entered under the old system. Were they at once transferred to the ward-room mess?—Yes.

974. Did they get all the benefit of the new scale of pay, position, and relative rank?—Yes, all.

975. The change was made instantly, not after a short time?—Yes, at once; and the ward-rooms of vessels were enlarged to admit them.

976. Did you at that time get engineers from the mercantile navy?—Yes; but they had to be young men under 26 years of age; generally about 21.

977. Should you receive them now under the present regulations?—Yes, if we could get them to pass the examinations.

978. Are you aware what the relative pay in the mercantile marine in the United States is, as compared with the government pay?—I think it is less in the mercantile navy.

979. (*Captain Dowell*.) Have your men in the navy retiring pensions?—All the officers in the navy are on the same footing in that respect. The retiring pay of all officers in the navy, those who have been retired after faithful service, is 75 per cent. of the full-pay.

980. (*Mr. Wright*.) By "full-pay" you mean the pay that they are receiving at the time of their retirement?—75 per cent. of their full sea pay.

981. (*The Chairman*.) Is any age fixed for that retirement?—Yes; 62.

982. (*Captain Commerell*.) That is, every officer?—Yes, every officer. Whether he be an admiral or any other grade, he must retire at 62.

983. (*The Chairman*.) At what age is he allowed to retire?—If he has served for 40 years faithfully, he can elect to retire.

984. On 75 per cent. of his pay?—Yes.

985. You say that you do not always enter 30 engineers in each year; but even if you only entered 20, is not that more than you require for the service?—There is a large number of vacancies existing that we have not been able to fill, for the reasons which I have stated to you.

986. Will this list show us the relative proportion in each rank of officers, assistant engineers, chief engineers, and so on?—Yes. Here is the law, which says, "That the officers of the engineer corps on the active list of the navy shall be as follows: 10 chief engineers, who shall have the relative rank of captain; 15 chief engineers, who shall have the relative rank of commander; and 45 chief engineers, who shall have the relative rank of lieutenant-commander or lieutenant." The reason why it says "or lieutenant" is because the rank is according to length of service.

987. (*Captain Commerell*.) The rank of lieutenant-commander is one which we have not got in our service?—No. Then it says, "100 first assistant engineers who shall have the relative rank of lieutenant or master, and 100 second assistant engineers who shall have the relative rank of master or ensign."

988. (*The Chairman*.) You have no rank of engineer?—No.

989. What number in the whole is it?—The number in the whole allowed by law is 100 first assistant engineers and 100 second assistant engineers.

990. That would be 200 under the rank of chief engineer?—Yes.

991. (*Mr. Wright*.) You have only got 140 below the rank of chief?—Quite so.

992. (*The Chairman*.) It is considered by the regulations that it requires 30 entries every year to make up the waste of that number?—Yes.

993. What causes the waste?—Heretofore, previous to the "rank" settlement, it was caused by dissatisfied engineer officers who found preferable employment outside the navy.

994. Have you any idea of the proportion of men who adopted that course?—I cannot say now, but it was very large.

995. Is there any fixed age for the promotion of an assistant engineer to the rank of chief engineer?—No.

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996. What is it regulated by?—By the vacancies.

997. About what age is a junior engineer when he is promoted?—The oldest now on the list has been 14 years in the navy; he must be 35 years old.

998. Are they promoted by seniority entirely?—No, by examination.

999. By competitive examination, or seniority and examination?—Yes; when a vacancy occurs for a chief engineer, the senior assistant on the list (*referring to pamphlet*) will be examined, and if he fails the next man on the list will be examined, and if he passes he goes up; then the other man who has failed once will be examined again at the end of a year, and if he fails again then he goes out of the navy altogether without any compensation; but if he passes, then he would go up under his former junior. Often it is found necessary to go down the list several numbers to get one that can pass the examination.

1000. This examination, I understand, is only conducted when there is a vacancy?—Yes.

1001. Is the style of the examination in any of these books which you have handed in?—No.

1002. Can you tell the Committee in what subjects he is examined, say for the rank of chief engineer?—I stated a while ago that they were examined mostly in design and construction for the rank of chief engineer.

1003. Does that examination involve a high class of mathematics?—Not the highest course, but it is pretty well up. We expect the examination of all the graduates from the academy to involve a high course.

1004. How do you enable officers at the age of 35 to maintain the knowledge requisite to pass the examination after so many years away from school?—He must keep booked up; he must be always studying and keep himself up to the times, otherwise he will fail at the examination.

1005. You have no system as we have of allowing officers of a certain rank to qualify for a higher rank whenever they choose?—No system, except individual exertion and study.

1006. But I mean they are not allowed to pass the examination until they come to the head of the list, or a vacancy occurs for their promotion?—Sometimes it happens that they will be examined in anticipation, knowing that a vacancy is to occur, and then the candidate will have to wait for the vacancy after passing.

1007. But he must be pretty well at the head of the list to do that?—Yes.

1008. Is that the last examination which they have to pass?—For chief engineer, that is the last.

1009. After that there is no more?—No, no more.

1010. Have they an examination to pass for the lower promotions from assistants?—Every grade, until they come up to chief engineer.

1011. By whom are they examined?—By three chief engineers selected by the secretary of the navy; first of course by a board of medical officers; and if the candidate fails to pass the medical officers he will not then be examined by the engineer board.

1012. What happens to him?—He is allowed to be put on sick leave for a year or more, when he is then examined again by the medical board, and, if found still unfit or likely to remain unfit, he is put on the retired list.

1013. Is the test for the medical board the same as for entry; you would disqualify a man if he had one arm, I suppose?—Yes, he would go on the retired list.

1014. I see there is one officer named as engineer-in-chief with the rank of commodore; with flag rank?—Yes; he has that rank, also some retired staff officers. Here is the law upon that point: "That officers of the medical, pay, and engineer corps, who shall have served faithfully for 45 years, shall, when retired, have the relative rank of commodore, and officers of these several corps who have been or shall be retired at the age of 62 years before having served for 45 years, but who shall have served faithfully

until retired on the completion of 40 years from their entry into the service, shall also from that time have the relative rank of commodore."

1015. With three-fourths of their full pay?—Yes. We have no civil officers on board vessels of war, except clerks. They are military, of all corps.

1016. Could you give the Committee some information about the artificers on board?—Before we come to that I wish to explain to you that these first 16 chief engineers having the rank of captain do not go to sea on board ship.

1017. Their duties are as is mentioned in that book?—Their duties are on shore; these next 15 are the officers from whom the fleet engineers (what you call inspectors of machinery afloat) are taken; one to each flag-ship in the fleet.

1018. Ranking with commanders?—Yes, ranking as commanders.

1019. I see you have the term "inspector of machinery"?—No, I think not.

1020. It says chief engineer appointed as inspector of machinery afloat?—There is no such grade in the navy, that represents the duty; for instance, I am at present general inspector, but that is not my title.

1021. What you term a fleet engineer, represents our inspectors of machinery afloat?—It corresponds to it.

1022. Can you inform the Committee what is the pay of the artificers who are appointed under the chief engineer on board ship?—Yes, you will find it in that book (*pointing out the page*).

1023. The pay of the artificers varies according to the ships in which they are employed?—Yes.

1024. How is the scale of pay regulated; by the pay which they receive in the private trade?—No; the pay was much lower than that at the beginning, and we could not secure competent men; those obtained were found to be worthless, and the scale of pay was raised for the purpose of remedying the evil.

1025. I see it is machinists or fitters, 76½ dollars a-month; boilermakers, 41½ dollars a-month, and coppersmiths, 41½ dollars a-month?—Yes.

1026. (*Captain Dowell.*) Is that a-month of 23 days?—31 or 30 days.

1027. (*The Chairman.*) Does their pay increase according to their length of service?—It has not as yet.

1028. How long has this scale of pay for artificers been established?—It was established about three years ago, I think.

1029. Are you aware whether the rate of pay is higher than that which they are paid in the private trade?—Do you speak of fitters employed in the factories?

1030. No, afloat; whether they receive the same market rate of wages as they would in a private factory on shore?—It depends so much upon the man's ability as a fitter; but I think it is nearly the same.

1031. Are those men entitled to a pension?—Yes.

1032. In what rank are they considered on board ship?—As petty officers.

1033. The fitter has far higher pay than any other class?—Yes, they were obliged to raise it in order to get competent men; they mess on board ship with the master-at-arms.

1034. What is he called, a chief petty officer?—A chief petty officer, I think.

1035. Is he the only one that messes with them?—He is a superior petty officer, that is, superior to all the others that mess with him, and have all the privileges that belong to that class of petty officer.

1036. What dress do the artificers wear on board?—They do wear a dress, but I am not prepared to answer what it is.

1037. (*Captain Dowell.*) Would there be any other petty officers of the same rank, any seamen petty officers?—No.

1038. Do those men ever rise to any higher rank than this?—No, they are not eligible for promotion

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1039. Not to the rank of a warrant officer, the same rank that a boatswain would be?—No.

1040. I suppose in your service you would have men of about the same relative rank as our boatswains and gunners?—Yes.

1041. (*Captain Commerell.*) Your sailmakers are warrant officers, are they not?—Yes.

1042. (*The Chairman.*) Under your present regulations the artificers do not ever rise to their rank?—No.

1043. According to the present regulations there is no rise in either their pay or position from the time they enter?—No.

1044. Do you think they will be able to continue that, or do you think you will be compelled to give them a rise of pay?—I think they will be obliged to give them some increase of pay for continuous service.

1045. For what length of time are they entered?—They are entered for three years with the privilege of continuing.

1046. But they can leave at the end of three years if they choose?—Yes.

1047. Are you aware whether many do leave?—They do.

1048. I suppose, after a certain period of service, they obtain a pension?—I am not prepared to go into details of the question of pensions.

1049. Do you know what length of service is required to obtain a pension?—I do not remember.

1050. Do you think that the chance of a pension in after life is a great inducement for men to come to you?—No.

1051. Why not?—I cannot say why, but in our service it does not seem to be any inducement with those kind of men.

1052. (*Mr. Wright.*) What you hold out as an inducement to them to join is good pay to begin with?—Yes, as good pay and as good treatment as possible, because that class of men are not accustomed to being treated as stokers, or seamen, or petty officers.

1053. (*Captain Dowell.*) They never have anything to do with cleaning their mess, have they?—I cannot say.

1054. (*The Chairman.*) Who cleans the mess of the master-at-arms?—I do not know.

1055. What sort of examination have these men to undergo when they enter?—It is very much like yours; it ought to be in that book (*referring to the pamphlet before the Chairman*).

1056. For what length of time are your seamen entered; for any long period?—They enlist for three years.

1057. I think you said that a large number of the artificers do not rejoin?—Yes, a large number.

1058. At present, with this rate of pay, have you any difficulty in getting the number that you require?—We have a difficulty in getting the kind of men we need.

1059. That is, satisfactory men?—Yes.

1060. Do you know what number you have altogether in the service?—No, I do not.

1061. Are those men, of whom we are speaking, namely, machinists, boilermakers, and coppersmiths, liable to work in the yards, or on board ship, on equal terms?—Not in the yards.

1062. The men of whom you speak are simply for employment in the fleet?—Yes.

1063. Do you get the men in the yards to volunteer for this work afloat?—No.

1064. Do you know what pay a boilermaker receives in the yard?—A superior boilermaker, who is employed in the navy yard, would not go on board ship from the yard.

1065. That is to say a good workman?—Yes.

1066. You do not mean by "superior" superior in grade, but a good workman?—Yes, a good workman gets high pay with us.

1067. Do you remember what the pay is?—I do not at the moment.

1068. But the service is in no way interchangeable, the same as it is for officers; for them it is inter-

changeable?—No, it is not for the engineer petty officers.

1069. (*Captain Commerell.*) In what class of ship do the engineer cadets go and serve for two years?—In any vessel that happens to need engineer officers that may be fitting out at the time they are graduating at the academy.

1070. (*The Chairman.*) Has it been put to the proof yet; have they gone to sea?—Oh yes; you will see that in this book (*referring to the passage*). I am not sure whether they mess with the midshipmen, but they have the same rank and the same pay.

1071. (*Captain Dowell.*) On their first entry do they generally come from the same social position in society?—Yes, precisely; there may be two brothers, one for a cadet midshipman and the other for a cadet engineer.

1072. They are not at all of an inferior grade?—Not at all; the cadet midshipmen and the cadet engineers come from all classes of society in our country; the father may be a member of congress, or he may be a merchant, or from any other class.

1073. (*Captain Commerell.*) Would you be surprised if you found that one of the cadets was the son of labourer?—No, not if he could get nominated and pass the examination.

1074. (*Captain Dowell.*) Does such a thing ever occur?—I do not remember of any cases, but I think there has been several cadet midshipmen from the labouring class.

1075. He would have to obtain a nomination?—Yes; or have some friends to obtain a nomination for him.

1076. (*The Chairman.*) If the cadet engineers enter between the ages of 16 and 20 by competitive examination, is it the case that most of them are approaching a higher age?—No.

1077. Can you tell the average age of those that enter?—I think it is about 17.

1078. That would make them about 23, I suppose, before they were actually appointed as engineers?—Yes.

1079. (*Captain Dowell.*) Does their time for retirement count from that day?—From the day they enter the academy.

1080. (*Captain Commerell.*) Can you tell if all the officers have to mess themselves?—All officers have to mess themselves; they are allowed one ration if they choose to draw it from the ship, or are allowed the money for it; they all draw the money, which is only about 30 cents a day, I think.

1081. (*Mr. Wright.*) When do the young officers become commissioned officers?—When they are appointed assistant engineers.

1082. Are the cadet engineers required to do some pieces of test work before they are appointed as assistant engineers, such as coppersmith's work, or a piece of forging or brazing, and so on?—They are required to do that at the academy.

1083. Who are the examining officers appointed to test that work?—The engineer officers and others attached to the academy.

1084. The instructors, then, are the examining officers also?—They are examined by these officers shown here (*referring to a book*).

1085. You say that a chief engineer must retire at the age of 62; is there any time below that age at which he can retire optionally; our inspectors of machinery must retire at 60, or they may retire at 55?—There is no age below that at which they are allowed to retire, unless it is for disability.

1086. (*The Chairman.*) Did I not understand you to say that they retire after 45 years' service?—Yes, but then they will be 62 years old.

1087. When an officer retires at 62, with three-fourths of the pay he is then receiving, is that irrespective of the amount of sea or harbour service he may have performed?—Yes; irrespective of sea service or any other service.

1088. (*Mr. Wright.*) What officers sit on courts-martial to try engineer officers?—For the trial of the

Chf. Engineer, engineer officer there must be at least one engineer officer on the court; for the trial of a medical officer at least one medical officer on the court; and for the trial of a pay officer at least one pay officer on the court.

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1089. When you enter machinists for so short a period as three years, have you no difficulty at first in getting them to keep watch properly?—Yes.

1090. Our artificers are entered for 10 years' service?—So much the better.

1091. You think that your time is too short?—Yes, it is too short.

1092. (*Captain Dowell.*) You do not train them at all in your own dockyards, do you?—No.

1093. (*Mr. Wright.*) I heard sometime ago that an attempt had been made to make executive officers do the duties of engineer officers; was that tried?—It was tested on board the "Swatana"; all the watch officers in the engine-room were midshipmen, and one chief engineer in charge; but after a trial of three years, the system was abandoned.

1094. These midshipmen had some previous training in engineering duties, I suppose?—Yes, they had some.

1095. But not sufficient to make them qualified?—No; the system was abandoned after that trial.

1096. (*Captain Commerell.*) Do you know what made them abandon it?—It was very objectionable to the midshipmen themselves; they took no interest in such work; the machinery ran down, and there was a good deal of expense incurred in repairs.

1097. It was a failure altogether?—Yes.

1098. (*Mr. Wright.*) Are the naval engineers in your service in charge of all engines being made by contract, as well as having employment in the dockyard?—There is one appointed to every ship to superintend the construction and erection of the machinery.

1099. From the commencement of the construction?—The very commencement of the contract. The specifications are placed in his hands, and he has rigid orders to see that they are properly carried into effect.

1100. (*Captain Commerell.*) If anything is the matter he is responsible?—Yes, he is responsible.

1101. (*The Chairman.*) Do the engineer cadets pay anything for their education while in the academy?—No.

1102. I see that they provide 100 dollars, is that per year?—No.

1103. They only provide 100 dollars for their outfit for the four years?—Yes, that is all.

1104. (*Captain Commerell.*) Then they are paid 500 dollars a-year while they are in the academy?—Yes; just the same as cadet midshipmen. After they leave the academy they go to sea for two years, and get 1,000 dollars a-year for that time.

1105. (*The Chairman.*) During the course of their instruction in the academy, are there periodical examinations which, if they fail to pass, prevent them from continuing at the academy?—There are.

1106. And I think you mentioned that there are many who do fail to pass?—Yes.

1107. If they fail on examination, are they compelled to leave?—No, they are put back into a lower class, and after other failures they are turned out of the academy.

1108. They are under the same regulations as the cadet midshipmen when once they enter?—Yes, precisely.

1109. (*Captain Commerell.*) Do you find that the secretary to the navy is more particular in his nominations for engineer students, than the members of congress are in their nominations?—I think that a member of congress generally selects a nominee from his own friends, and the secretary of the navy selects his from different applicants in the country. Very frequently people of influence apply to him to have a certain boy nominated.

1110. Which do you think gives the better class of young men?—I think the competitive examination preferable.

1111. (*The Chairman.*) That is of cadet engineer?—Yes, the system: the boys are considered equal.

1112. Competitive examination after nomination?—Yes.

1113. (*Captain Commerell.*) Would you like to see open competition without nomination?—I would prefer to see open competition. I should like to see the whole thing open to any boys that would come of the proper age to compete for admission.

1114. (*Mr. Wright.*) Open competition simply without nomination?—Yes, with a limited number from each State.

(*The witness withdrew.*)

GEORGE THOMPSON, Esq., R.N., called and examined.

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1115. (*The Chairman.*) Have you any employment at this moment?—I am borne on the books of the "Fisgard," for taking the weights of the machinery of the Turkish ironclads. I am at Messrs. Maudslay's.

1116. What was your last service?—In the "Dromedary."

1117. And before that?—Before that in the "Crocodile."

1118. Were you senior engineer in the "Crocodile"?—Yes, senior engineer.

1119. How long were you in the "Crocodile"?—For three years.

1120. What staff of engineers was there in the "Crocodile"?—Eight engineers and assistants and one chief.

1121. And how many engine-room artificers?—Three.

1122. How long have you been in the service?—20 years in December next.

1123. That is reckoning from your first entry as what?—As a third class assistant, as it was in those days.

1124. Are you now on half pay?—I am paid now from the "Fisgard."

1125. How long were you on half pay?—For six months and a half.

1126. What pay did you receive?—6s. a-day.

1127. Were you promoted by seniority or before your time?—Before my time. I was in the Ashanti war.

1128. Were you serving on shore there?—I was the senior engineer on the station.

1129. How long do you suppose you were promoted before the ordinary seniority would have caused your promotion?—From the 31st of March, which was the date of my promotion, to the time when the last engineer was promoted to the rank of chief. I should have been promoted in the place of him.

1130. (*Captain Dowell.*) About 18 months?—Yes, about that time.

1131. (*The Chairman.*) How long were you in the service before you were promoted?—18 years and 3 months.

1132. At what age were you promoted?—38 years.

1133. Did you keep watch in the "Crocodile"?—No.

1134. In how many watches were the engineers?—In four.

1135. How many engineers were there in each watch?—One in two of them, and in the other two one engineer and an artificer. I am wrong, there were two engineers in two of the watches, and in the other two watches one engineer and one artificer.

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1136. What duty did the artificers do on watch?—They kept the stokehold watch.

1137. What trades were the artificers?—There were two boilermakers and one fitter.

1138. Were they useful men, who knew their work well?—Very well, indeed; they were very good men.

1139. With regard to the men in charge of the stokehold, would you consider them efficient men in charge of boilers, and quite capable of doing their work?—Yes, quite capable.

1140. How long had they been at sea?—That was the first ship that the two boilermakers had been in, but the third one, the fitter, had been a leading stoker in the service, and he was a remarkably good man.

1141. Do you know how he learnt his trade as a fitter?—I do not.

1142. Do you think that the ordinary course of promotion from engineer to chief engineer is satisfactory?—No, I do not.

1143. What would you suggest to improve it?—I would allow the chief engineers to retire quicker.

1144. What do you mean by "allowing" them to retire quicker?—That a chief engineer of 50 years of age should be allowed to retire on a maximum pension of £400 with 10 years service as chief, and for every year not served or wanting of that age a deduction of £15 to be made.

1145. You would allow them to retire before that age?—I would not allow them to retire but in case of their invaliding or anything of that sort.

1146. Do you think that many of the chief engineers would take advantage of that?—Yes, I think all of them would if they were 50 years of age, and most of them at that age have the 10 years in.

1147. You think that all of them at 50 years of age would retire?—I think they would.

1148. What is the age at which they can retire now?—It is optional at 50, and compulsory at 55 years of age.

1149. If they retired now at 50 years of age, what would they get?—That depends upon the servitude, and now a chief engineer must have his 11 years in as chief before he can count the whole of his junior time allowed. It generally averages about 53 years of age before the present chief engineers are entitled to the maximum.

1150. They are generally 53 years of age before they can get their 11 years' servitude in?—Yes, before they are entitled to the £400 a-year.

1151. About what age now are chief engineers when they are promoted?—I do not know one that is under 40 years of age.

1152. With the exception of yourself?—Quite so.

1153. Is there any other step which you would recommend in order to accelerate promotion?—I think that the engineers themselves should be allowed to retire at the age of 40 on an increased pension, say £8 a-year instead of £6 a-year, as at present.

1154. Does all their time count?—Yes; from their entry into the service it is £6 a-year, and the maximum is £130.

1155. When you had accomplished this large reduction of the chief engineers' and engineers' lists, how would you replace them?—By entering a greater number of engine-room artificers.

1156. Would you consider, then, that we could well afford to reduce the number of engineers in each ship?—Yes, by supplying their place with engine-room artificers.

1157. In a ship like the "Crocodile," what number of engineers do you think they ought to have?—Four and a chief.

1158. And how many engine-room artificers?—Five. Four to keep watch, but an engineer and one for day duty, to attend to the machinery and the various parts of the ship, and for the double bottom, water-tight doors, cocks and valves, and so on.

1159. Then you would reduce the total number of engineers and artificers altogether from what it is at present?—Of engineers I would. I was going to say that one engineer in such a ship as that should be an

extra man for keeping the engineer's books, as it would take the chief engineer the whole of his time to do it himself. That is always adopted now.

1160. Do not you think that the senior engineer could do that?—No; one of the juniors must.

1161. Do you think that it is necessary to have a man of position, rank, and education to keep those books?—No.

1162. Then whom would you employ to keep the books?—A writer.

1163. Do not you think that the engine-room storekeeper might be a man capable of keeping the books. What class of man is he?—We generally pick out one of the best of the leading stokers for that, but I think that the chief engineer ought to have a qualified writer.

1164. (*Captain Dowell.*) Might he be storekeeper as well?—He might keep a general look out as well.

1165. (*Mr. Wright.*) The storekeeper could not be spared to keep the books as well, could he?—I do not think so.

1166. (*The Chairman.*) Was the "Crocodile" in compartments?—Yes.

1167. Who had charge of the water-tight doors and sluice valves?—The chief engineer had charge of them.

1168. Who had the actual supervision?—The senior engineer.

1169. Under the chief engineer?—Yes, he was responsible to the chief engineer for the proper working of them.

1170. Had you any auxiliary engines in the ship besides the donkey engine for pumping out the boilers?—We had two deck winches for hoisting in the cargo.

1171. Who looked after them?—I used to look after them with the engine-room artificer of the day.

1172. Did you find any difference in the aptitude of the different trades of engine-room artificers in obtaining a knowledge of the management of the boilers, or were they all equally apt. Did the boilermaker learn the parts of an engine as well as the fitter?—I think preference might be given to the fitter.

1173. Have you thought at all upon the subject of what proportion of engineers you would like to see as compared with chief engineers?—I think there should be an increased number of chief engineers, and about 400 engineers and assistant engineers.

1174. Taking all circumstances into consideration, at what age, for the efficiency of the service, would you like to see a man promoted to the rank of chief engineer?—At 35 years of age.

1175. Do you think that the engineers have reason to be satisfied with their pay?—No.

1176. By "engineers" I mean engineers, not assistants?—Exactly. No.

1177. What change would you recommend?—An increase of pay to commence with, and a progressive rate of pay afterwards.

1178. Do not you think that more rapid promotion would more than compensate for increase of pay, because that, of course, is increase of pay?—Of course it is.

1179. Do you think that the engineers would be satisfied if they were certain about being promoted?—Not without an increase of pay whilst holding the rank.

1180. (*Captain Commerell.*) At what age do you think they would be satisfied to be promoted?—I think they would be satisfied if they thought they were sure to get promotion at 35 years of age, and to have a progressive rate of pay as engineers up to that age.

1181. (*The Chairman.*) At present, how many changes in pay have they from the time of first entry?—They have four scales of pay.

1182. Rising from 6s. to 10s.?—Yes.

1183. You would recommend that engineers should be allowed to retire with a higher retirement allowance at a younger age?—Yes.

1184. At what would you put the minimum age for

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an engineer to retire?—Until promotion is very much expedited I should like to see them allowed to retire at 40 years of age.

1185. What is the maximum retirement allowance that you think an engineer at 40 years of age should be allowed to receive?—£160, taking 20 years at £8 a year.

1186. If an engineer were to retire at the age of 40, what do you think he would do; what line of life would he pursue?—I think most likely he would try to get some yacht, or something of that sort.

1187. Where did you serve your time before you joined the service?—At an engineering firm in Leicestershire.

1188. Not marine engines?—No.

1189. How long were you there?—For seven years.

1190. Did you come direct into the navy?—No, I worked at Woolwich Arsenal?—I worked a large lathe there.

1191. And then you passed the examination that was necessary to enable you to enter the service?—Yes.

1192. Have you had any experience of engine-room artificers besides those in the "Crocodile"?—I had one with me in the "Dromedary," but I cannot speak very well of him.

1193. Should you say that the engine-room artificers whom you know in the service are superior as workmen to the young engineers in the service?—Yes? as workmen they have had a greater amount of experience.

1194. I mean as practical workmen?—Yes, exactly; they can handle their tools better.

1195. Were the junior engineers in the "Crocodile" second class or first class assistants?—At first they were second class; one attained the rank of engineer during the three years. We had several changes there; there are generally two assistant engineers.

1196. What effect does it appear to you that the regulations of 1863, establishing the engineer students, have had upon the engineers; do you think that they are better or worse than they were, and if so in what way?—In the first place, I think that there is not that strict supervision kept over them while they are in the dockyard that there ought to be while learning the practical part of their profession.

1197. You mean that they have not been taught enough manual work?—There is the facility afforded them to learn it if they think proper, but there is not that strict supervision over them which would compel them to learn it.

1198. Therefore, you do not think that they bring as much practical knowledge into the service as was the case before?—Quite so.

1199. Are you aware of the regulations that were established two years ago for the better instruction in practical work of the engineer students at the dockyard?—No.

1200. Do you think those instructions (*handing a circular to the witness, see Appendix 4*), would have a beneficial effect in the very direction of which you speak?—From what I see by glancing at them, I should think that they would be the very thing, if carried out.

1201. Is there any other point connected with the engineer officers in the service that you would wish to put before the Committee, and that you think would benefit the service?—If I may be permitted to suggest it, I should say that the services of the engineers while in the steam reserve, which are now taken up on board the different floating factories and in the workshops, would be far better employed for the benefit of the service if they were allowed to watch the construction of our ironclad ships, as eventually they will have to be in charge of the double bottoms, and in fact of the whole of the hull below the water-line, which, with the knowledge so attained, they would be more prepared to take charge of. Though a chief engineer is called upon to take the responsibility for the whole of the ship below the water-line, yet there is no facility afforded either to him or the engineer

which would enable them to obtain a knowledge of the construction of the vessel, so as to render them capable of carrying out their duties properly.

1202. Do you mean that they should take part in the construction, manually?—No; that they should be simply there to watch the construction of the ship. Facilities are given now to the carpenters for the very same purpose, whereas on board ship the carpenter, I may say, has really nothing whatever to do with the lower part of the ship.

1203. Would you have them examined as to the knowledge they pick up in those matters, if allowed to watch over the construction of a ship, so as to see whether they had taken advantage of the opportunity afforded them?—There ought to be certainly some means taken to insure their proper attention to it, whether there should be an examination or not, I do not know; but I am sure that every engineer would feel it to be his duty, as well as his interest, to watch the construction.

1204. How many hours a-day do you think would with advantage be given up to that sort of examination and watching?—Say four hours a-day.

1205. (*Mr. Wright.*) Would you propose that those engineers should afterwards go in the ships as engineers belonging to them?—Well, that might be done, though it could not be done in all cases.

1206. (*The Chairman.*) Is it not the case that the chief engineer and one other engineer are generally appointed to a ship very early in her construction?—Yes.

1207. Do you think it would be advantageous if the engine-room artificers were also appointed to the ship very early in her construction, so as to watch over the bottom and the valves?—I do.

1208. Are you aware of the pay of the engine-room artificers?—Yes.

1209. What is it?—5s. a-day for the first three years and 5s. 9d. afterwards; they are engaged for 10 years.

1210. Do you think that the engine-room artificers who are now in the service will re-enter at the end of their 10 years on that rate of pay?—Yes, I think they would, but at the same time I do not think they would be satisfied.

1211. Then what would make them re-engage?—Because they have a prospect of pension, and because 10 years of their life have passed away.

1212. At the end of 10 years what position in the private trade do you think the engine-room artificers would be suitable for?—For what they call the leading men of jobs at the large engineering firms; they take charge of the erection of machinery.

1213. Would they also be qualified for engineers in the merchant service, in a good many merchant steamers?—I think they would. I think that the merchant service would be very glad to get them after they had had 10 years' experience at sea.

1214. In the "Crocodile" where did the engine-room artificers mess?—It was just forward of the master-at-arms' place; a little table that the chief engineer got was put there. It was granted as a great boon to himself rather than anything else.

1215. Did they mess with the master-at-arms?—No, they messed alone at that little table forward of the master-at-arms.

1216. Who cleaned their mess for them?—One of the stokers.

1217. Did he mess with them?—Yes.

1218. Who scrubbed their hammocks?—That stoker did.

1219. Do you think that the question of cleaning their mess and scrubbing their hammocks is a difficulty with them?—Yes, a very great one.

1220. What dress did the engine-room artificers wear?—The same uniform that they do at present; a short jacket with uniform buttons and a cap with an anchor and crown but no laurel.

1221. Would you wish to see any change made in their dress?—No.

1222. Do you think that the engineers generally

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would be pleased at a reduction of the number, by "number" I mean number on the navy list as well as number in each ship, supplementing them by engine-room artificers?—I do, because it would give a greater chance of promotion to the rank of chief.

1223. When you entered the service what was the rate of promotion to chief?—About 11 or 12 years.

1224. And now it is what?—Nearly 20 years.

1225. From entry?—Yes.

1226. When did you pass for chief engineer?—I think it was in 1866.

1227. Who passed you; were you examined by Doctor Woolley?—Yes, I obtained his certificate in December, 1864.

1228. What age were you then?—I was 29.

1229. Do you think that you could pass that examination now; the mathematical one?—I could not this afternoon, or to-morrow either.

1230. But do you think you could with a little warning?—Yes.

1231. Are you acquainted with the system of examination for the engineer students in the service, or do you know how the students are selected?—No, I do not.

1232. The system is open competition, and any one who is physically qualified can compete. Do you think that that system brings into the service the class of men that you would wish to see in the service?—No, I do not.

1233. Do you think that a system of nomination by the Board of Admiralty would be better than the present system?—Yes, most decidedly better. I would enter them not to receive any pay for the first two or three years as students.

1234. (*Captain Dowell.*) With regard to the engine-room artificers, are you aware whether they are satisfied with their present position, or not?—They are not satisfied with it.

1235. What is the reason of their dissatisfaction?—Their pay is too small, and they say that the position is not such as they would wish to have.

1236. With reference to the pay; what pay do you think would satisfy them, or have you any idea what they expect to get?—I think that they have rather extravagant ideas upon that score, they expect about 7s. a-day to commence with, which I think is considerably too high.

1237. What position do they expect?—Very many of them have an idea of becoming warrant officers.

1238. Do you think there will be any objection to the seniors of them, after a certain number of years, becoming warrant officers?—None whatever. I think it would be a very good thing for a very limited number of them to attain to the rank of warrant officers.

1239. What is their relative pay at present as compared with that of men holding a similar position in the dockyards, such as fitters, and so on?—I do not know what the pay of the dockyard men is.

1240. (*Captain Commerell.*) It is 6s. 6d. a-day?—It is 6s. 4d. a-day at Maudslay's.

1241. (*Captain Dowell.*) The artificers substantially get the same pay?—The artificers only get 5s. 9d. a-day after being in the service for three years.

1242. But they get it for seven days instead of six?—Quite so; I did not think of that.

1243. And they also get their lodgings?—But they have to go away from their homes to make up for it, and they have to go to sea too.

1244. Have you ever been with engine-room artificers in other than a troopship?—Only in the "Dromedary," we had one there.

1245. Did he do the duty of an engineer?—Yes, and he had never been in any other ship; that was his first ship as engine-room artificer. Now, I would suggest that engine-room artificers should be sent in large ships at first so as to learn to keep watch under the engineer.

1246. You say that they are dissatisfied with their position?—Yes.

1247. And that they expect to be made warrant officers?—Yes.

1248. Are they dissatisfied with their position as chief petty officers at present, and if it were granted that they could rise to warrant officers, do you think they would then be satisfied?—No, they expect a mess place, in fact they expect a proper mess berth.

1249. Like the engineers?—Yes.

1250. (*Captain Commerell.*) What proportion of engine-room artificers would you allow to attain the rank of warrant officers?—About 40, who should be appointed to our large ironclads for the special purpose, under the chief engineer of course, of attending to the double bottoms, water-tight doors, cocks and valves, and the different engines situated about the ship, and, indeed, all the work out of the engine-room.

1251. You would give them entire charge of that department under the chief engineer?—Yes.

1252. Would you select those men by seniority after a certain number of years' service, or by qualifications?—After a certain number of years' service, say 10 years, of course taking their merits into consideration too.

1253. We have had it stated in evidence that the pay of the engine-room artificers should be 10s. a-day, do you consider that too much?—I think that if they entered the service at 6s. a-day on probation for one year, and were then, if found eligible, confirmed, and at the expiration of five years received 6s. 6d., with 10 years' service 7s., and after 15 years' service 7s. 6d., which should be the maximum, it would prove satisfactory.

1254. (*The Chairman.*) Until they are made warrant officers?—Of course, there is always that hope.

1255. You would then increase the pay?—I would give them the pay of warrant officers.

1256. (*Captain Commerell.*) Would you assimilate their pay to that of all warrant officers?—I believe there is now a new regulation by which the classes are abolished.

1257. But according to the time served, you would give them the same as other warrant officers?—Yes.

1258. You stated that you did not think that the class of engineer students was quite satisfactory. Do you think that they are physically as good as they used to be?—Yes, I think they are.

1259. We have had it stated in evidence that their extreme education produces an unfavourable effect upon their physique, what is your opinion with regard to that?—That may be the case, but I do not think so.

1260. Do you think that the value of the work which the students perform in the dockyard, is more thought of than the amount which they learn?—Yes.

1261. What would you regard as the primary thought for an engineer student, in order to bring him up for the service as an engineer?—His education is the primary thought, and then a thoroughly practical knowledge of his work.

1262. (*The Chairman.*) You would combine a good scientific education with a thorough practical knowledge of the work required of them?—Quite so.

1263. (*Captain Commerell.*) Do you think that an engineer student of the present day, when he passes into the service as an assistant engineer, has the same practical knowledge of his profession as was the case before the engineer students were instituted?—No, I do not.

1264. How would you alter that?—That circular, if properly carried out, would alter it (*referring to circular before the Committee*).

1265. (*Mr. Wright.*) Were the artificers in the "Crocodile" able to keep watch in the engine-room, as well as in the stokehold?—We never gave them a watch in the engine-room.

1266. Were they acting or confirmed artificers?—Two were confirmed, and one was acting; in fact, at the latter end of the three years they were all confirmed.

1267. If a man never had an opportunity of keeping watch in the engine-room, how could he obtain the knowledge necessary to enable him to be con-

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firmed. The regulations say that he must keep watch in the engine-room before he can be confirmed?—Yes; in small ships you are bound to put them to keep watch in the engine-room.

1268. You say that the engine-room artificers should be put into large ships in order to gain experience, but if they are put into large ships, like the "Crocodile," they will have no chance?—But they have had a thorough experience in the use of boilers; after a man has been for three years keeping stokehold watch in one of those troop ships he is quite capable of taking charge of the engine-room watch in all small ships.

1269. Still if the number of engineers were reduced, and more engine-room artificers were put into large ships, they would have to keep watch in the engine-room. Do you think it would be necessary to give any special instructions with regard to their watch-keeping, other than those which at present exist?—Yes, I think it would be necessary.

1270. (*The Chairman.*) In the largest class of ironclads, what is the smallest number of engineers that you would recommend being appointed?—I would give about five engineers.

1271. How many watches do you think the engineers should be in at sea in the troop ships?—In four.

1272. And in how many watches in the ironclads?—In three.

1273. If you had five engineers would you still

excuse the senior engineer from keeping watch?—Yes, I would excuse the senior, and then the other four could keep watch. The present regulation is to take one for the books.

1274. Would you recommend that?—I would not.

1275. Do you think that in the case of an engineer student coming from the dockyard it is right, on his appointment to a large ship, to put him in charge of a watch at sea?—No.

1276. How would you teach him if you reduced the number?—By allowing him to keep watch under an engineer in one of the large ironclads for 12 months.

1277. Could you do that with five engineers in the "Sultan"; could a fifth engineer learn his duty under them?—He could; there would only be one, and not two or three students sent to the ship.

1278. Do you think there would be any harm in appointing a young engineer to small ships, on first going to sea, to have charge of a watch in the engine-room?—He ought to be quite competent to take charge of a watch, but I think it would be better to go into a large ship at first.

1279. Is it not at present the case, that many young engineers go into small ships to take charge of a watch?—Yes.

1280. You think it indispensable that there should be a junior engineer in the watch under a senior?—Yes.

(*The witness withdrew.*)

THOMAS A. HEARSON, Esq., R.N., called and examined.

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1281. (*The Chairman.*) What position are you now holding?—I am instructor in applied mechanics at the Royal Naval College.

1282. You were educated at South Kensington, I think?—Yes.

1283. When did you first enter the service?—In the year 1864 I became an engineer student.

1284. When did you leave South Kensington and take your diploma?—In the year 1871.

1285. What ship have you served in?—In the "Agincourt."

1286. Were you assistant engineer in the "Agincourt"?—I was.

1287. How many engineers had you in the "Agincourt"?—One chief engineer, six engineers, and myself.

1288. Had you any engine-room artificers?—Yes, three.

1289. What trades were they?—One was a boiler-maker and the other two were fitters.

1290. As a rule, do you think that the engine-room artificers are better manual workmen than the young engineers who join the service?—I do not think they are better; the three in the "Agincourt" were very good, I understood they were exceptionally good men.

1291. Do you remember what pay they received?—They all received the advanced pay of 5s. 9d. a-day.

1292. Do you think that those men will remain in the service after their 10 years' service shall have expired?—I am not prepared to say whether they will or not; they were moderately satisfied, and yet dissatisfied with certain small things.

1293. What were they dissatisfied with?—With their messing arrangements.

1294. Where did they mess?—Most of the time at a mess table on the main deck, forward.

1295. By themselves?—Yes.

1296. Not with the master-at-arms?—No.

1297. Did they clean their own mess?—They had a boy to do that for them.

1298. Do you remember whether they scrubbed their hammocks?—I do not know, but I think not.

1299. Have you heard many complaints amongst the engineers with regard to the slowness of promotion?—Yes.

1300. What would you suggest to expedite it?—That inducements should be offered to senior chief engineers to retire by giving them their junior time, allowing them to count service as third assistant, now second assistant, for retiring allowance, and that engineers should be allowed to retire if they wish to do so.

1301. You think that the senior chief engineers should have their junior time given them?—Yes.

1302. And a proportionate retirement for that time should be given?—Yes.

1303. At what age would you let them go?—I have not thought of that; I thought of allowing engineers who wished to retire to leave at any age.

1304. Is there a scale of retirement for the junior engineers?—Yes.

1305. You mean, to retire on the present scale of retirement at any age?—Yes.

1306. Do not you think that if that were allowed we should lose some of our best men. Instead of reducing the list in the most advantageous way, we should lose our best men?—Yes, I think we should be in danger of that.

1307. Do you think that if optional retirement were given throughout the engineers' list, they would go from the upper half or the lower half of the list?—Not from the lower, but from the middle and upper parts, I think.

1308. Why should that be so?—I think that the lower half would remain in the hope of promotion; if the upper half remained, and were promoted, they would have but a short time to enjoy the higher rank, and would not be able to complete sufficient service to obtain a substantial increase of retiring allowance according to the present scale.

1309. Would they have as much chance of getting employed out of the service as the younger ones?—I think so, and they would have more retiring allowance.

1310. Do you think it would be advantageous for the service to reduce the number of engineers in the service?—Yes.

1311. And in each ship?—In each ship; I do not know of any exception.

1312. What would be the least number of engineers

they could do with in the "Agincourt"?—Five engineers and a chief would be enough, I think.

1313. What experience had you had in the management of engines before you actually went in a sea-going ship?—No experience.

1314. Had you no opportunity of learning in the Steam Reserve?—No.

1315. Were you at any time in charge of a watch in the "Agincourt"?—Yes, nearly the whole of the time.

1316. How long after you had been on board was that?—Not more than two or three months.

1317. After you had been on board two or three months you had charge given you of a watch in the engine-room?—Yes.

1318. During that two or three months had you had experience at sea?—I had been at sea.

1319. And you felt yourself fully competent to take charge?—Yes; in that ship the engines were of a simple kind; we were at the time going under easy steam, and there was no difficulty, as there is in many other ships with newer engines and arrangements for obtaining increased economy.

1320. Whose engines were they?—Messrs. Maudslay and Sons'.

1321. During the six years that you were in the dockyard, were you satisfied with the practical instruction which you received in the fitting shop?—Not at all.

1322. Who examined you in the practical work?—I had no examination at all in practical work.

1323. Have you seen this circular of May 1873? (*handing the same to the witness, see Appendix 4*). Do you think that that circular is likely to improve the practical instruction given to the students in the dockyard?—Yes, I think it has caused a great improvement, but I do not think it is yet thoroughly carried out. I may also say that it is not perfect; there are some points which are bad, being a step backward rather than forward, one especially, viz., that the students are not allowed to attend school in the afternoon of the last two years.

1324. You think that the circular is not entirely carried out?—No.

1325. In what points?—The work which is chosen for them to do is not always the most suitable for teaching them useful practical work; the man who has charge of them has not often sufficient authority, if he has sufficient knowledge or judgment, to choose it.

1326. Do you think it would be possible in a dockyard, where they have certain fixed work to do, to always select work specially with reference to the instruction of the students; do not you think that some difficulty must arise upon that point?—There would be some difficulty, but I think it might be done better than is the case at present.

1327. Did you attend drawing classes when you were an engineer student?—Not at the dockyard, because I went to Kensington before the time appointed for it.

1328. Do you think it is desirable that the students should attend the drawing classes?—Yes, decidedly, very desirable.

1329. At present they only attend it during one year of their servitude?—Only during the fourth year.

1330. Do you find in your intercourse with the engineers in the service that they have any particular cause of grievance in the service, and if so, what is it?—They, being officers, are not accorded privileges corresponding to their age, such as cabin accommodation. The mess berth in which they have to live is nearly always situated in the dark, and away from the other officers.

1331. Could matters of that sort be improved more easily if the numbers were reduced?—Yes, more easily.

1332. Would you like to see any change in the mode of entry of engineer students, which is now by open competition, and if so, what change?—I would not say that there should be any change. The boys at Greenwich school should not be, as they are now,

educated specially to pass the required examination. I would not say they should be entirely prevented from competing, but they should not be educated specially in order that they may be able to enter the engineering branch of the service. A clever boy should have the opportunity, but an average one should not be brought up to the required point by special training.

1333. Would not the object be gained by allowing only those to compete who are nominated by the Board of Admiralty?—That object would be gained.

1334. What would be the harm of it?—That would depend upon how the nominations were distributed. I think the competition should be enlarged rather than diminished. If the number of nominations were confined, an evil would be produced.

1335. Would you wish to see any limit put upon the class of life from which these student candidates are drawn?—The limit should not be defined, I think.

1336. I do not say that it should be, but should any limit be put?—As the grade of society got lower the difficulties of passing the examination, &c., would be increased.

1337. So that the educational test should be the test of the social status?—Yes.

1338. Should you not desire to see a reduced number of engineers admitted to the ward and gun room messes?—Yes.

1339. Do you think it is possible that could be done if they are allowed to enter from any class of society, however low?—I think that the one or two boys from a comparatively low class of society, who may have passed, being of superior intellect, would, by their training and by intercourse with their colleagues of a higher social position, take such a tone that they may on entering the navy be admitted to the gun and ward-room messes, without injury individually or to the service.

1340. At what age do you think a man should be promoted to the rank of a chief engineer?—An average man would be competent to undertake the duties of a chief engineer after ten years' service. If promotion were delayed beyond that time, he should be made more comfortable as an engineer. I think he might enjoy one-third of his period of service as a chief engineer.

1341. (*Captain Commerell.*) He should be for one-third of his time a chief engineer?—Yes, an average engineer; but if an engineer shows more than ordinary ability and attainments, it will be not unjust to his brother officers, and of great advantage to the service, to promote him earlier, that he may, for a greater fraction of his service exercise his ability uncontrolled in the management of the machinery under his charge.

1342. (*The Chairman.*) Have you had any intercourse with the engineers in the merchant navy at all?—Scarcely any.

1343. Then you do not know anything of their position?—Very little.

1344. (*Captain Dowell.*) I do not think you have quite stated what is the grievance of which the engineers in their present position complain; what would you wish to see altered immediately?—That they should have a progressive rate of pay, and not be kept on the same rate of pay for the whole of their lengthened period of service as engineers, and that during the latter portion of this time they should have cabin accommodation.

1345. You say that they should have an increase of pay; what do you consider would be an adequate payment for their services?—I think if they are not promoted before the age of 40 they should have then 12s. a-day.

1346. What is your opinion with reference to the pay of the junior engineers; the first and second class assistants?—I think they should commence on 7s. a-day.

1347. (*Captain Commerell.*) Instead of 6s a-day?—Yes, and they should not be five years before they are entitled to wear a stripe; in fact, I feel rather

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inclined to suggest that they should be allowed to wear a stripe immediately on entering the service.

1348. (*Captain Dowell.*) They should be put in the position of commissioned officers at once?—Yes.

1349. Do not you think it would be for the good of the service if, for the first year of service at sea, they were considered acting?—Yes.

1350. Until they were proved to have an aptitude for their duties?—Yes.

1351. Do you consider that the time which is allowed to count for all their time is sufficient. At present, after so much senior time, so much junior time is counted. Do you think that is satisfactory?—That is a question which I have not studied.

1352. (*Mr. Wright.*) Are you satisfied with your own prospects in the service as a naval engineer?—Do you mean independently of my position at the college?

1353. Yes, independent of that?—Not at all.

1354. Is there anything which you could suggest should be done for yourself and others in order to improve the prospect?—I presume you mean the students of the school of naval architecture, and those who attend the advanced course of study at the naval college. The best should receive appointments at the home dockyards and at the admiralty. (This has to a small extent been already done, so I should not have said "not at all" in answer to a previous question). Others might advantageously be sent to foreign dockyards, such as Malta and Gibraltar, or be employed in inspecting the erection of engines being manufactured by private firms for the government.

1355. (*The Chairman.*) Do you think it is advisable that four engineers should be selected every session of the college for a higher education, or only two?—Two, I think.

1356. Do you think that there are prospects sufficient for two men to be highly qualified every year?—If they were employed in the manner just stated, and had also the prospect of obtaining advantage by promotion by selection after a certain number of years' service. The chances of being a chief engineer early, and of becoming an inspector of machinery, would offer sufficient prospects.

1357. You would, of course, make that dependent upon their capabilities as practical engineers when they were afloat?—Yes.

1358. (*Captain Dowell.*) Where did the engine-room artificers in the "Agincourt" muster at divisions?—At divisions they stood near the stokers.

1359. By whom were they inspected, or were they inspected?—Practically not.

1360. With reference to the stokers—was the stokers' division under the engineer officers?—Yes.

1361. Entirely?—At divisions on Sundays.

1362. And for the slop list?—Yes.

1363. (*The Chairman.*) Who took their slop list?—An engineer.

1364. (*Captain Dowell.*) Did you ever hear the engine-room artificers complain of their uniform?—Yes.

1365. (*The Chairman.*) What did they want?—They wanted to be allowed to wear a coat; they also complained about their chest, it has been altered several times; their chest now is very small, and they want a bigger one.

1366. Have you any remarks to make with regard to the engineer students during their time of service in the dockyards?—The engineer students are not

treated as gentlemen, or as if they were about to become officers. In the dockyards they are treated exactly as if they were intended for the work and social position of artisans; for instance, they are searched by the police on leaving the dockyard even at the end of their time, when they are on the point of being admitted as officers in the navy. They have no place or time allowed them for washing their hands or changing their clothes, and in many other respects they are classed with the workmen; this injures the self-respect of a boy. I think if the authorities wish to induce the sons of gentlemen in larger numbers to enter this branch of the service, a remedy of those things would be most fruitful. Gentlemen living in dockyard towns become acquainted with these matters, and rarely send their sons to compete for studentships. Gentlemen living at a distance, not aware of these matters, may, and when their sons are successful, feel greatly deceived.

1367. You think that one of the great reasons which prevents them from entering, is their treatment as engineer students?—Yes. I think also that the amount of evening study which they are expected to do, is too much, after such a hard day's manual work as they are expected to perform.

1368. Are you speaking of the first three years?—During the whole of their time, in order to maintain their positions at the examinations, they are obliged to devote a large amount of time to private study. Too much time is occupied in mere manipulation at the bench and lathe. A larger portion of their time at the dockyards should be devoted to the acquirement of general engineering knowledge of a practical kind.

1369. Do you mean with reference to the construction of engines?—I mean with reference to taking indicator diagrams, the stoking and management of factory engines and boilers, and instruction on the various kinds and qualities of coal. They should make sketches of the portions of machinery about the dockyards, and receive instruction on the action and forms of the steam-engine.

1370. Do you mean have lectures upon the steam engine?—Yes, for at present facilities for obtaining this information are very meagre. I think it could be well and easily given by an engineer officer belonging to the steam reserve.

1371. Would you extend their drawing instruction at all?—Yes.

1372. You would give them more of it?—Yes, I think the evening instruction they get in drawing is neither efficient nor adequate. I think for some portion of their time they should be required to make sketches, write descriptions, and arrange them in the form of a diary.

1373. The whole of them?—Yes, for some portion of their time. I would suggest also that some engineers for the navy be taken from private firms; they should be required to pass an examination, be allowed to study for one term at the royal naval college, and then be required to pass a final examination for admission to the navy. Thus in time of war this may be a source from which an increased number of engineers may be drawn.

1374. If they did that, would you require them to pass a similar examination to that which our engineer students pass now on leaving the dockyard?—Yes.

1375. Do you think that you would get men?—Yes; a few, I think.

(*The witness withdrew.*)

Adjourned to the 19th instant at 12 o'clock.]

TUESDAY, 19TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMEREILL, R.N., K.C.B., U.C.

JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

CAPTAIN WILLIAM ARTHUR, R.N., *called and examined.*

1376. (*The Chairman.*) What was the last service in which you were employed?—I was in command of Her Majesty's ship "Iron Duke," the flagship on the China station for three and a half years.

1377. Do you remember what number of engineers and engine-room artificers you had on board the "Iron Duke"?—The number of engineers varied, we never had less than six.

1378. Besides the chief?—Yes, besides the chief; and there were generally supernumeraries awaiting disposal.

1379. And what number of engine-room artificers were there?—We took three engine-room artificers out from England who belonged to the ship, and likewise six supernumeraries, who were distributed amongst the fleet on arrival in China.

1380. But you had three?—Yes.

1381. Do you remember what trades they were?—One was a fitter, one was a blacksmith, and the other was a boilermaker; we had also a stoker mechanic as a blacksmith.

1382. Did they do their duty satisfactorily?—They did their duty very satisfactorily; at the beginning there was some trouble with them as regards discipline, but not to any great extent, and this only for the first few weeks.

1383. Can you say what points of trouble they were?—They did not return accurately from their leave, and it appeared that they did not fancy being tied down to a few minutes, the same as the other chief petty officers.

1384. Were they treated like the other chief petty officers as regards leave?—Yes, exactly.

1385. Where did they mess?—On leaving England they messed in the flat with the petty officers.

1386. With the chief petty officers?—Yes, but as there were only two chief petty officers amongst the seamen, the engine-room artificers afterwards wished to form a mess by themselves, augmented by some of the leading stokers.

1387. Were they actually in a mess with the petty officers, or had they a separate mess near the petty officers?—They were in a mess with the petty officers, the leading stokers' mess.

1388. Did they clean or help to clean their own mess?—They helped to clean their own mess, the same as the other chief petty officers; the seamen chief petty officers always had a boy attached to them who acted as cook of the mess, and in the same way they had a junior stoker to attend to the mess.

1389. In how many watches were the engineers?—The engineers were in three watches, and two were in a watch, one on watch in the engine-room and the other on watch in the stokehold.

1390. In the absence of any of the engineers did the artificers ever keep watch in the stokehold?—Yes, occasionally; but we have lent them to do duty in the gunboats as regular watch-keepers.

1391. Who had charge of the watertight doors, and valves, and double-bottoms?—There was a divided responsibility between the chief engineer and the carpenter. They were under the chief engineer, but the senior engineer was also in charge.

1392. Did he ever keep watch, do you know?—He did not.

1393. During the three-and-a-half years that the "Iron Duke" was in commission, were her engines ever repaired by the factory?—No, never.

1394. The engines and boilers were kept entirely in repair by the artificers of the ship?—Yes, entirely, and we never had a hot bearing during the commission; nor were the engines ever stopped from any defect whatever. The boilers had repairs done to them by the dockyard at Hong Kong; they had also additional stays put in.

1395. By the factory at Hong Kong?—Yes; and at my suggestion, and the suggestion also of the chief engineer, zinc was suspended in the boilers to stop the corrosion which was going on; that was also done by the dockyard fitters.

1396. Have you any suggestions to offer to the Committee as to the relative number of engineers and engine-room artificers that it would be advisable to have in a ship of that class?—I think the number of engineers might be reduced, if trustworthy and experienced engine-room artificers were in charge of the stokehold. The engineers now are not so much working men as they were. The repairs are generally done by the engine-room artificers; and I seldom saw an engineer doing a job of work. I think as watch-keepers it is not necessary to have two on duty at the same time, but I would not allow an engine-room artificer to take charge of the stokehold until he had had say five years standing, and not even then unless he had passed a satisfactory examination; then he would be also qualified to keep watch in the engine-room of a small vessel, which I have known done before.

1397. Would you not consider that if a man is an unusually intelligent man, and can pass the examination, he is competent to take charge of engines at the end of a shorter period than that, say the end of a year?—I see a difficulty in placing him over the heads of others.

1398. I mean to take charge on an emergency?—If he, by passing an examination, was given some increase of pay it would give him a kind of status. I should then see no objection.

1399. Supposing the engine-room artificers were so increased in number as to be able to carry out all the repairs necessary afloat would you still consider it desirable that we should have a small body of well-educated men as engineers in charge of the engine-room: by "well-educated" I mean as distinguished from merely practical men?—Certainly, I think that the engineers must now become more scientific and less practical; and it would exalt the status of engineers if they had less to do with the laborious or manual work.

1400. Are you aware of the present regulations for the admission of engineer students to the dockyard?—I have not considered the subject much.

1401. The present system is, that it is open to competition, to all lads of a certain age, whatever their social rank in life may be; do you think that is a system which it is advisable to continue; this paper (*handing a paper to the witness*) will show you the occupation of the parents of those students who have been entered during the last three years?—I should consider it very advisable that there should be a nomina-

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tion obtained from the Admiralty, previous to the examination; and to improve their position, I should recommend that engineer students should be boarded, say at some establishment like the naval college at Portsmouth, and a certain sum paid towards the necessary expenses by their parents.

1402. You think it desirable that they should be drawn from a higher social class than is at present the case?—Certainly; I think it very desirable. I have seen great necessity to increase their social status, and I have also seen great improvements in the last few years, but still they are not admitted into the society, on shore, that other officers are; and although their mess, I consider, is on an equality with the gun-room mess, yet you cannot, until they raise themselves, introduce them into the society that you would wish, or introduce them into the gun and ward-room messes in the service. I should look forward to the time eagerly when they do so far improve their social position as to enable them to join the gun-room mess, but at present I see several difficulties upon that point; the first is, that they are frequently married men, and desire to live on as little as they can on board ship; the second is, that they are of a greater age than the usual run of gun-room officers. All vessels, on leaving England, have generally a senior sub-lieutenant in charge of the gun-room mess, but after an absence of, say two years, the senior men are promoted, and the mess is in charge of a young officer, who probably left England as a midshipman, and he consequently has a difficulty in maintaining his position in charge of the mess, and the presence of so many other officers in the mess, of a much greater age than himself, will increase those difficulties.

1403. Have you any suggestions to offer to the Committee as to the pay and half-pay of the engineers at present in the service?—At certain periods of their servitude the pay is very good; frequently I have known an engineer on watch in the engine-room, who was in receipt of the same pay as the lieutenant in charge of the ship on deck; but in the higher ranks the pay does not increase in the same ratio. I should therefore propose, in case of any alteration in the pay, to give it to the inspectors of machinery and senior chief engineers.

1404. An engineer is now promoted to the rank of chief engineer at about the age of 40 or 42; at what age do you think it desirable that the promotion to the rank of chief engineer should be made?—As the pay of the senior engineer when in charge of the engines of a small vessel very nearly approaches that which he would receive as chief engineer, I see no reason why those officers when in charge of the engines of larger ships under a commander's command should not hold the rank of chief engineer, which would increase the number of those officers, and would consequently enable you to promote them sooner. I think that every engineer should be promoted before he reached the age of 35; the increase of pay of an engineer very nearly approaches that of a junior chief engineer.

1405. From your answer to the last question, I gather that you do not consider that the step in pay which the chief engineer receives is equivalent to his step in rank?—Yes; that is my opinion.

1406. Is not that made more plain when you remember that he is at once put into the ward-room mess where his expenses are necessarily greater, and become a more serious matter to him?—Yes; but I approve of the principle of the pay being progressive previous to his promotion, and if you adopt that system there can be no sudden jump in the increase.

1407. Are you aware of what the compulsory mess subscriptions were in the different messes in the "Iron Duke," the ward-room, the gun-room, and engineers' messes?—The ward-room and gun-room messes were kept strictly within the regulations, and the engineers' mess was always considerably less than that which they were allowed to spend.

1408. (Captain Dowell.) That is less than 30s.?—Yes, quite so.

1409. (The Chairman.) And they had no wine fund?

—They were permitted to buy in wine, if they liked to have it. I may, perhaps, mention that the mess was conducted on strictly economical principles; they lived on as little as they could, and divided the expenses at the end of the month. The consumption of wine was almost *nil*; they seldom had any wine in the mess; gin and beer were what they mostly drank.

1410. Are you satisfied with the uniform that the engine-room artificers wear?—I think the question of their uniform would have to be taken into consideration, together with the question of the improvement of that of the other chief petty officers of the ship.

1411. You would wish to see the artificers placed in the same position as the other chief petty officers, whatever it may be?—Yes; I should like to see the chief petty officers have a mess place bulkheaded at the foremost and aftermost sides; the chief petty officers of the seaman class are at present looked upon very highly, and if the engine-room artificers messed with them, instead of lowering it would increase the respect for them amongst the ship's company.

1412. In a ship like the "Iron Duke," where would you propose to put their mess place?—In the flat which the chief petty officers selected for themselves to form their messes in, in preference to the lower deck; and I would like to see a servant entered for the purpose of attending to them, or a first-class boy told off for the duty in the mess. I mean a first-class boy should be made to mess with the petty officers; boys will not go there of their own accord, but I would make them take their turns.

1413. Do you consider that the chief petty officers, including the engine-room artificers, should clean their own mess out and scrub their own hammocks?—As regards cleaning out their own mess, the chief petty officers have always willingly performed that duty, and as to scrubbing their hammocks, they are on exactly the same footing as the midshipmen were a few years since, who had either to do it themselves, or pay others to do it for them; the chief petty officers do get people to scrub them, as a rule I think, although I have seen them do it themselves; they scrub their hammocks separately from the ship's company.

1414. Should you think that if we desire to obtain an efficient class of engine-room artificers we must bear in mind that these men are not educated on board ship as boys, and that they would require different treatment from the other chief petty officers?—The chief petty officers are treated now in so many respects, more especially as to leave, the same as the other officers of the ship, that I see no reason to alter the regulations in that respect. Every captain would take into consideration the ignorance of these men unaccustomed to the service, and would treat them accordingly: they have always appeared willing and anxious to adhere to the regulations, and, as I stated before, after a few months they were the best conducted men, or, I should say, equally as well conducted as the seamen chief petty officers of the ship.

1415. I think you stated that, with regard to the uniform, you had an idea that the treatment of all the chief petty officers required to be considered on that point. What sort of uniform would you recommend for them?—Something the same as that of the master-at-arms.

1416. Have they not the same at present?—No, they have no cloth tunic, but I mean that, instead of altering their uniform, I would rather see all chief petty officers dressed alike.

1417. Then you think that the engine-room artificers have a satisfactory uniform at present?—Yes. With regard to the future prospects of the engine-room artificers I should like to add that, after a certain period, they might be promoted to the rank of warrant officers, and join the engineers' mess.

1418. Would it not appear, that if you gave the engine-room artificers frock coats, that we should be gradually introducing engineers under another name, and so be getting into the same difficulty as we are in at present?—I should guard against that by promoting

them to the rank of warrant officers, instead of to any grade of assistant engineer.

1419. By making their highest rank that of warrant officer?—Yes.

1420. (*Mr. Wright.*) For what length of time before that should they be artificers?—For ten years.

1421. (*Captain Commerell.*) You would make ten years obligatory?—Yes.

1422. Without reference to qualifications?—Yes.

1423. (*The Chairman.*) At present an engine-room artificer enters for ten years' continuous service?—Yes.

1424. Do you mean, then, that you would offer to an engine-room artificer the rank of a warrant officer at the end of his ten years, in order to induce him to re-enter, of course provided his character and qualifications were satisfactory?—Yes; at the end of ten years he should be eligible to be promoted to the rank of a warrant officer; but must expect to serve until promoted.

1425. Do you think that the present engine-room artificers, of whom you have had experience, will remain after their ten years shall have expired, with the present rate of pay?—I think that a large proportion, say half, would, if any inducement were held out to them.

1426. (*Captain Dowell.*) But not as things are at present?—There is no inducement whatever now; after six years service they can get no higher.

1427. (*The Chairman.*) Would you increase their pay from what it is now, during those first ten years, supposing we require to largely increase the number?—Yes, contingent upon their passing an examination, after six years' service, showing them to be able to take charge of the engines of a small vessel or the stokehold of a large vessel.

1428. Are you aware that there are many engine-room artificers in the service now who keep watch in the engine-room of small vessels, and do so satisfactorily, but who have less than six years service?—Those cases would have to be dealt with exceptionally, and when doing that duty they should receive extra pay.

1429. From what source do you think we should draw our engine-room artificers?—From either private or the dockyard factories.

1430. Are you aware of the wages which men of that class, such as fitters and boilermakers, receive in the private trade?—I am aware that the wages are much higher than those given on board ship, but many yet go to sea from a roving disposition; and it must be remembered that they are found in board and lodging; and really, if they feel so inclined, they are able to do on board ship that which they can never do on shore, namely, lay by the whole of their pay.

1431. Is it not another point in favour of the pay of an engine-room artificer at sea, that he receives pay for seven instead of six days a-week, and has a prospect of pension. Do you think that would weigh with them?—As a rule, I do not think that the pension is ever considered amongst the younger men; probably after having completed their 10 years they could be induced to re-enter, as they would not be inclined to leave the service until they had received their pension, even if the second engagement were only for five years, it should be borne in mind that these men are frequently on foreign stations offered a very high rate of wages in private factories and places on shore, and are tempted to give up the service. I have known several cases of this; but, of course, a man's request to be allowed to leave could not be acceded to, unless he had completed his period of service.

1432. Do not you think that the certainty of permanent employment also weighs favourably with them?—I do not think that they consider that. I was going to say to you that I think there is nothing more unsatisfactory than the relations between the chief engineer and the carpenter of the ship.

1433. In a previous answer which you gave, you stated that the engineer and the carpenter shared the

responsibility of the charge of the double bottoms and the water-tight compartments?—Yes.

1434. Can you in any way inform the Committee how that responsibility was divided?—The division was so small or fine between the duties of those two officers that it necessitated frequent references to the captain on that point. The carpenter is head of all the artificers in the ship, and, consequently, amongst the many trades, such as the blacksmiths and plumbers, and so on, that had no connection with his previous education, he, of course, was obliged to rely upon the engineer for information upon certain points, and altogether the connection between the two, or rather the want of connection between the two, was very unsatisfactory, even the title of "carpenter" misleading or tending to mislead.

1435. Have you ever thought whether it would be desirable in iron ships to have only a chief carpenter's mate in charge of the artificers who work in wood, and to leave the chief engineer in charge of the bottoms and the iron work of the ship, with his artificers to assist him?—That would probably tend to solve the difficulty; but it would be necessary to make a different arrangement about the charge of stores; an assistant engineer would have also to be told off or employed to superintend the work going on in different parts of the ship.

1436. Was the bottom of the "Iron Duke" entirely covered with cement?—Yes, the double bottom had an average depth of 10 inches over it.

1437. Was that for ballast, or for the preservation of the iron?—It was for ballast, it was mixed with scrap iron.

1438. Who did you consider responsible in the "Iron Duke" for the good condition of the double bottom, of the iron rivets and joints, and as to their wanting painting and repair?—At the commencement of the commission the chief engineer was responsible for all the compartments between the foremost and after bulkheads of the engine-room and stokehold, and the carpenter for outside; but as by an Admiralty circular they were afterwards made conjointly responsible, I received a report from the engineer, signed for the whole of the compartments, which was likewise signed by the carpenter; the engineer also periodically gave me a written report, as to the state that the bottom was in, and what compartments he had recommended should be taken in hand.

1439. (*Captain Dowell.*) Do you think that if the position of the engineer students were improved there would be a difficulty in getting the sons of gentlemen to enter as engineers in the service?—I should say not, more especially if they were kept under instruction in some establishment.

1440. You are aware, no doubt, that great dissatisfaction exists amongst the engineer officers in the navy; do you know of any reasonable grievances of which they complain?—The want of promotion amongst the engineers, and the length of time which they are kept before they are allowed to mess in the ward-room. I mean to say that the want of promotion defers the time for their messing in the ward-room. The maximum pay of a chief engineer is now restricted to 22s., in which respect he is similarly situated to a staff commander, navigating lieutenant, and chaplain, but the grievance is in his case intensified by his having had considerably more junior service than those other officers; still I do not see how that pay could be much increased without increasing that of the inspector of machinery, taking into consideration that the chief engineer is also receiving pay for being in charge of engines.

1441. Are you of opinion that the inspectors of machinery are adequately paid?—No; for instance in the "Iron Duke" the chief engineer, in consideration of his duties in the flagship, and no inspector of machinery being borne, received in addition to his pay of 22s., a sum of 5s. a-day, and he was likewise entitled to 3s. a-day for being in charge of engines, which made his pay up to 30s., which is 5s. more than an inspector of machinery gets. I certainly think that the principle of progressive pay, which holds good until

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1442. What proportion do you consider the junior ranks of engineers should bear to the chiefs to ensure a flow of promotion?—I could calculate it; that would depend upon the proportion in the numbers; given the age of 55, there would be no difficulty in calculating the number.

1443. You have not thought of it?—I have not, but I see no difficulty in it. Assuming the age of 35 as the age at which it would be desirable to promote an engineer to the rank of chief engineer, and that the age of 55 is a suitable age for retirement, I should be glad to work out the numbers, and furnish them to the Committee.

1444. (*The Chairman.*) Supposing the engine-room artificers to be competent to take charge of a watch, and the boilers, and occasionally the engines, what number of engineers and engine-room artificers would you think necessary for the "Iron Duke"?—The chief engineer, three engineers watch-keepers in the engine-room, and a senior engineer for general duties, with six engine-room artificers.

1445. Who kept the engine-room register in the "Iron Duke"?—The senior engineer was responsible for it, but a very good writer used to assist him.

1446. He kept all the accounts?—He kept the accounts under the general supervision of the chief engineer.

1447. Have you thought at all how, if we reduced the number of engineers in the service, we could, in the event of war, obtain sufficient engineer officers for the increased number of ships which we should probably have in commission?—Some years since I suggested a plan to the Admiralty, which would be applicable to engineers as well as to chaplains and surgeons, it was as follows: To lump the whole pay which the officers receive during their career, take a mean thereof, add to this their half-pay, as being non-effective service, which would give you the scale of pay on which I would take these officers for a short period of service, they would have no claim on the service for pensions, but when paid off from their ship, although not necessarily ineligible to serve again, would be considered entirely clear of the service. I should place no impediment on their receiving their discharge at any time, making any of them on foreign stations pay for the passage out of their successor. I think by making this offer it would be found that the pay offered would be considerably in advance of that which they now have on joining the service, and that many would be inclined to enter the service for short periods in peace time, and it would be found a means of expansion in war time. During the Crimean war, the engineers that were entered for temporary service upon a high rate of pay, under the name of locomotive engineers, were certainly not men qualified for the duties that they were called upon to perform, but in that case we confined our selection entirely to men who had driven locomotives, on account of high pressure engines being then first introduced into the service in gunboats.

1448. (*Captain Dowell.*) In the "Iron Duke" where did your engine-room artificers muster, and who inspected them?—The stokers' division was under the superintendence of the senior engineer, who inspected them and reported them to the commanding officer; they were again inspected by the captain and chief engineer, who accompanied him at the captain's inspection of divisions. The engine-room artificers fell out to the front, facing the division, and the leading stokers formed a supernumerary rank in the rear, in a similar way to the chief petty officers and petty officers of the seamen divisions.

1449. (*Captain Commerell.*) In the American navy all officers of the different branches are assimilated with regard to their pay, status, and privileges; do you think that that system could be carried out with us?—I look forward to the time when such a thing could be possible, but I think it will be several years before you can so mix up the messes together. If the

space on board ship will admit of it, I see no objection to all the officers taking their meals at the same table, beyond the expense, assuming that afterwards they each have their respective messes to retire to. The payment of the American navy is on an entirely different principle from ours; it commences with a high rate of pay, considerably more than is given in any other naval service, but when they approach higher ranks, it becomes considerably lessened. For instance, the pay of a captain in the American navy is considerably more than the pay of a captain in the English navy, but the pay of an Admiral in the American navy will be found to be less; this principle would be found to be advantageous, if you wished to obtain men fully qualified to assume a certain position, but when part of your officers are educated by the Crown, as youths, and part of them are entered into the service, the question of pay becomes more complicated. If the principle were adopted of an assimilation of pay, it would also be necessary to make a deduction, either in pay or pension, from those who had been educated by the Crown, to repay the other for the money they had expended on their own education, and that again would make the equality of pay not badly represented by the pay which now exists.

1450. Do you think that the junior engineers are competent to perform the practical repairs necessary as the engine-room artificers?—I think not. I have generally found the engine-room artificers to be very superior workmen, and the junior engineers may be considered as not so efficient upon that point.

1451. The engineer students are now six years in the dockyard, serving in the workshops with other mechanics. Are you aware whether there is any watch kept over their continued respectability during that time, and do you consider that the instruction which they lead in the workshops is one which will prepare them for their future career as engineers in the service?—I should prefer to see the engineer students, although practical engineers to such an extent as to enable them to be good judges of a job of work, instructed more fully in the scientific and other branches of their profession, and, as I stated before, to be placed under continued supervision during the term of their instruction in a school or otherwise for that purpose.

1452. Have you heard complaints from the engineers relative to the difference made in the privileges of the respective messes?—Yes; but in most cases I have considered the complaints trivial. As regards invitations, I have once or twice had a complaint from the engineers that the invitations addressed "To the officers of the ship," had not been forwarded on to them; but the reason given generally was that it was not intentional. I have always considered the invitations to extend to them as well as to the other officers of the ship; but previously, in the case of public invitations of governors or other public officials, I insisted that it was requisite they should have made a call previous to the invitation.

1453. (*The Chairman.*) Are you aware that the Admiralty decided some years ago that invitations "To the officers of the ship" were not to include the engineers?—I have heard so, but never saw a memorandum to that effect, and did not take that view of the question. The rank of these officers has lately been increased, which must be taken into consideration. I have known cases where military and other messes, having thought that there was a probability that the engineer officers would be considered to be in the general invitation, have worded their invitation "To the captain, ward-room and gun-room officers," for the purpose of excluding them. They certainly do not mix on shore in the same society as the midshipmen, but this is a social question which we cannot remedy by legislation, and a question which nothing but time can solve.

1454. (*Captain Commerell.*) Is there nothing else but time that will settle it, in your opinion?—I was thinking it may be time and their own merits.

1455. Do you think it would be advisable to bring

up our own engine-room artificers the same as our own engineer students, giving them a practical instead of a theoretical education?—I should be inclined to say not so long as they can be obtained in any other way, because at present we can obtain them from the private factories, where their experience would be more general than it would be in a government dockyard.

1456. What pay on entry do you consider that the artificers should receive?—I think that the pay on first joining is sufficient, but I should be glad to see the pay progressive. Their value is considerably enhanced after three years' service, and I do not consider that 9d. a-day represents their increased value. I have already stated, I think, or suggested that they should be advanced to the rank of warrant officers, and be allowed increased pay after passing certain examinations.

1457. (*Mr. Wright.*) You expressed an opinion a short time ago that engineers are not now so much working men as they were; do you mean by that that they do not do so much work on board ship or that they are less capable of doing the work if required?—I mean that they are not so frequently seen handling the hammer and chisel as I remember they were 20 years ago.

1458. If the number of engineer officers were in the future considerably reduced, would you relieve them altogether from manual labour on board ship in the way of doing repairs?—Yes, under ordinary circumstances, but they must be capable of undertaking repairs.

1459. And you would expect them to do repairs in case of emergency?—Yes.

1460. Were your engine-room artificers capable of taking a watch in the stokehold or engine-room in the "Iron Duke"?—There were two men who were very effective, one of whom I lent for several months to keep watch in a gun vessel, and the commander of

of that gun vessel spoke very highly of his services, and said he would as soon have him as any engineer he had in the ship. Captain Wm. Arthur, R.N.

1461. In a ship like the "Iron Duke," with so many engineers, they have not an opportunity of keeping watch themselves?—In the "Iron Duke" the engine-room artificers were generally employed as practical engineers, and were seldom called upon to keep watch, even in the stokehold.

1462. (*The Chairman.*) Have you observed that the physical qualities of our engineers have at all deteriorated, or do you think that they are what they should be with reference to health, stamina, and their power of doing work?—They certainly generally are not healthy men; but I attributed that fact more to their not taking outdoor exercises and not going ashore for a long walk and joining in cricket and similar outdoor exercises, than to anything else.

1463. With reference to the engineers that you propose to take in from the private trade for short periods, what examination would you subject them to in order to see if they were qualified?—I would examine a man in his own practical work only, independently of the theoretical, except so far as taking indicator diagrams.

1464. Would not that class of men more represent the engine-room artificer than the engineer we wish to enter into the service, and do you think it would be a good system to extend to the engine-room artificers?—I see no objection whatever to extend it to the engine-room artificers, but the class of men that I should try to induce to come into the service in case of war, or any other emergency, would be more the engineers from large merchant steamers, and men qualified immediately to take charge in the engine-room.

1465. You think that system would be more especially valuable in time of war?—Yes, very valuable in time of war.

(*The witness withdrew*)

MR. CHARLES EPHRAIM UFFINDELL, R.N., called and examined.

1466. (*The Chairman*) Where are you now serving?—I am in charge of the "Fire Queen" at Portsmouth.

1467. What was your last seagoing ship?—The "Lord Warden."

1468. And the vessel before that?—The "Ranger."

1469. When did you serve in the "Hercules"?—The "Hercules" was before the "Lord Warden."

1470. Have you served in any other ironclad ships?—Yes, in the "Invincible."

1471. What is your standing as an engineer?—Eight and a-half years.

1472. How much previous time had you in the service?—I have had about 16½ years altogether now.

1473. From your first entry?—As third assistant at that time.

1474. What is your pay now?—10s. a-day, and 1s. a-day charge money.

1475. How long were you in the "Hercules"?—Just over three years.

1476. How many engineers were there in the "Hercules"?—Nine, including the assistants.

1477. And the chief?—Yes.

1478. What engine-room artificers had you?—Four.

1479. What position did you hold there?—I was at first third, and afterwards I was second.

1480. What was your special duty in the "Hercules"?—Looking after the ship generally; the double bottoms, bulkheads, valves, and water-tight doors and all auxiliary engines and gear about the ship.

1481. You did not keep watch?—Yes, I kept watch besides.

1482. What auxiliary engines were there?—A 40-horse pumping engine; that was the only engine we had with the exception of a small engine for hoisting

ashes, and a boiler, a small one, on deck attached to this engine.

1483. Was that generally used for the auxiliary engines, or did you take steam from the big boiler?—Mostly from the big boiler, as the auxiliary boiler primed so badly.

1484. Had you a steam launch?—Yes.

1485. Had you charge of that engine?—No, I had not.

1486. Had you a steam capstan?—Yes, we had.

1487. Had you charge of it?—It was worked from the fire-engine.

1488. Had you any steam steering gear?—No.

1489. Neither steam nor hydraulic?—No.

1490. Had you charge of the double bottom in the compartment of the engine-room and stokehold only, or throughout the ship?—Throughout the ship.

1491. Did the carpenter share that charge with you at all?—Yes he did.

1492. In what way?—In going through the bottom and reporting upon it.

1493. You inspected the bottoms together?—Yes.

1494. And reported together?—Very often we did.

1495. You considered yourself responsible to the chief engineer, I suppose?—Yes, certainly.

1496. Did you report to him?—Yes.

1497. Who had charge of the water-tight doors?—I had.

1498. Entirely, or in conjunction with the carpenter?—I had charge of those doors entirely.

1499. Fore and aft of the ship?—Yes.

1500. Was the bottom of the ship covered with cement?—You might almost call it cement, but it was a kind of pitch.

1501. Of what thickness was it?—In some parts

Mr. Chas. E. Uffindell, R.N.

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Mr. Chas. E. three-eighths of an inch, and in some parts one-eighth
Uffindell, E.N. or a quarter of an inch.

19 Oct., 1875. 1502. Did you require to repair it during the commission?—It rather wanted it; it used to peel off; it got dry and peeled off.

1503. What trades were your engine-room artificers?—One was a fitter, one a blacksmith, one a boiler-maker, and the other man, I think, was what they call an erector (erecting engines).

1504. Did they all receive the same pay?—Yes.

1505. Were all of them thoroughly useful men?—Three of them out of the four were; one was no good at all.

1506. Which one was that?—He was the fitter; he was a bad workman.

1507. Do you know where he was brought up?—I do not.

1508. What was their pay per day?—I think it was 5s. per day, if I remember rightly. They had all just entered the service; that was in the year 1868.

1509. Is that fitter of whom you speak in the service now?—No, he is out of it. He was sent out of it, as he was so useless.

1510. Are the other three men in the service now?—I have met two of them, but I cannot speak as to the third one.

1511. Are those men likely to re-enter or not, after 10 years, do you think?—I think not; I do not think they are satisfied with the service.

1512. With what are they dissatisfied?—Their pay is not sufficiently high for one thing; it does not bear comparison with the pay which they receive on shore.

1513. What pay would they receive on shore?—I believe they would work up to 6s., 7s., or 8s. a-day, that is to say, the good men.

1514. A boiler-maker?—A boiler-maker would receive 6s. a-day.

1515. That is 36s. per week, and at present that man receives 40s. per week?—They do not get such good pay in the private trade as fitters, a fitter gets better pay.

1516. In the dockyard they get about the same?—Yes.

1517. What pay would you suggest that the artificers should receive; would you give the Committee your opinion upon the subject as to what the career of an engine-room artificer should be in the service?—If you want good men the pay ought to be more; there should be a greater number of fitters than boiler-makers in a ship as they are more useful men to have in the ship and engine-room; and they ought to receive, at the very least, 5s. 6d. or 6s. a-day when they enter the service.

1518. Would you increase that?—I would, certainly.

1519. In what way?—I would increase it after three years' service by 6d. or 1s. a-day; gradually increase it.

1520. Going up to what maximum?—Say up to 6s. 6d. or 7s. a-day.

1521. When they had completed their 10 years' service would you re-enter them in an improved position, or what inducement would you offer them to re-enter after 10 years' service?—I think they should be kept as engine-room artificers. I do not think they should have any rank above that; the line ought to be drawn there.

1522. You would give them the increased pay due to their increased value?—Yes; as they would have had more experience through being on board ship.

1523. In the "Hercules," did the engine-room artificers keep watch in the stokehold at all?—Yes, at times.

1524. Have you known cases where engine-room artificers have kept watch in the engine-room in small ships?—I have never been in ships where it has been done, but I have known of cases.

1525. After what length of service afloat do you suppose the engine-room artificer ought to be ex-

amined as to his qualifications for keeping watch in the engine-room?—I should think from two to three years, say after two years.

1526. Do you think that the engine-room artificers have any other cause of complaint?—I think that the accommodation on board ship is very bad indeed for them; it very often clashes with their duty. I speak as to the position they hold in a ship where they are on the lower deck. I think, if they had a mess themselves, and were made a little more comfortable it would be better; they are not like men who have been brought up to the sea, they are men who have been living on shore, and have been looked at frequently.

1527. You would rather see them mess by themselves?—Yes; particularly where there are four or five of them.

1528. And not made to clean out their own mess?—That is a very great drawback. I have known cases in ships which I have been in, where they have been called away from their duty in order to clean the messes out when they ought to be in the engine-room, and they are men who have never been accustomed to that sort of thing.

1529. Are you more likely to get men suitable for engine-room artificers from the private trade or from the dockyard?—The dockyard I do not think supplies many.

1530. Why do not they come from our dockyard?—Because they are better off where they are, I think.

1531. With regard to the uniform of the artificer, do you think that is satisfactory or not?—Yes.

1532. You think it is a suitable one?—Yes, I think so.

1533. Have you ever heard them complain of their uniform?—No, with the exception of about one case. I think they were comparing themselves to writers, who wore frock coats, while they were not allowed to have that article.

1534. Are you satisfied with the condition of the engineers' list now?—No.

1535. How many years have you been an engineer?—Eight years and a half.

1536. When do you expect in the ordinary course to be promoted to the rank of chief engineer?—No at all.

1537. Why not?—Because I do not see any chance at all of it.

1538. What age are you now?—I am 35 years of age.

1539. Are you qualified for the position of chief engineer?—No.

1540. Why do not you qualify?—Because there is no chance of my being promoted, not the slightest; my idea has been to avoid passing, so that I could leave the service at any time, in case I wanted to do so, after the age of 45.

1541. (Captain Commerell.) And you cannot do that if you qualify for chief engineer?—No, I am liable to be stopped from going.

1542. To be promoted?—Yes.

1543. I suppose that liability would not be objectionable, would it?—I do not know that.

1544. (The Chairman.) In the ordinary course of promotion, when would you come to the top of the list of engineers?—Promotion has been very fluctuating during these last two or three years, but looking at the list of chiefs, I should say not for the next ten years, or anything like it; in some years there are not more than 10 or 12 engineers promoted. Even if I got promotion in eight years' time it would be of no use to me, as I shall then be eight years older, and not fit for promotion.

1545. What do you intend to do?—I shall retire as soon as I possibly can.

1546. By the present regulations, in 10 years' time, you can retire?—Yes.

1547. But you cannot before?—No.

1548. But would you retire now if you could?—I would indeed.

1549. With what retirement?—With the time that they would give me.

1550. How much can you retire on in 10 years' time?—I should have my full pension of £130 a-year, that is the maximum, and I could not get more than that although I should be entitled to it by the number of years I have been in the service.

1551. Are you of the average age for your standing, or older or younger?—I am younger.

1552. In what year did you enter the service?—In the year 1859.

1553. Was that before the entry of engineer students?—I think so.

1554. What would you suggest with regard to improving the position of engineers in the service?—I should suggest that the number should be greatly reduced.

1555. How would you reduce the number?—One way of course would be by stopping the entry, but that would not be sufficient, and the other way would be to offer retirement to the older engineers; there are a great number of engineers now not fit to be made chiefs, they are quite old, and too old to be at sea, a great number of them.

1556. What age are some of them?—Almost 45 years I think.

1557. If the list of engineers were reduced greatly how would you fill up the numbers on board ship?—By entering engine-room artificers.

1558. In a ship like the "Hercules" what proportion of engineers and engine-room artificers would you recommend?—I should say four engineers would be sufficient in a vessel like that, and one chief, and the rest engine-room artificers to make up the same complement; you may want a larger complement perhaps.

1559. Is it your opinion that you would want more or less engine-room artificers?—More, I should say.

1560. More than you have of engineers and engine-room artificers together?—No; if we reduced the number of engineers, we must have more artificers than we have got now.

1561. You have now nine engineers and four engine-room artificers, making a total of 13 altogether; do you think that you would still require a greater total complement than that?—Perhaps you would require 14.

1562. Why?—It may be necessary in carrying out the work.

1563. Do you think that the engine-room artificers are as good workmen as the young engineers who now join the service?—Yes, as good as the students who enter the service; they are very backward in their mechanical abilities. I do not think that their practical training is paid sufficient attention to in their examinations. I have noticed that they have never been examined in mechanical ideas at all; it has always been schooling; there is no mechanical examination except when they enter the service.

1564. Since the end of the year 1873, there has been a great difference made; instead of being examined by the officers at the dockyard, who teach them, they are examined by the officers of the steam reserve?—Yes.

1565. Do not you think that that is likely to improve their practical knowledge?—It seems to tend that way; but still I think when they have these examinations they should undergo an examination in practical knowledge, during the time they are apprenticed they ought to be examined now and again; they only have one examination as to their mechanical abilities, which is when they leave the dockyard.

1566. If the engineer students of the present day are inferior to the engine-room artificers as workmen, why do you want more engine-room artificers to do the work?—Because we have not the engineers.

1567. But if you are going to substitute engine-room artificers for engineers, and those engine-room artificers are better workmen than the engineers, why do you want more of them?—The engineers are much

more skilled than the younger branch, that is the first and second assistants.

1568. There is a general complaint throughout the service that the engineers are not such good workmen as they might be; do you think that is well founded?—There may be cases, but I have not seen many myself; I have seen a few.

1569. Do you think that you are likely to get as good workmen from the engine-room artificers as from the old engineers?—I have no doubt you could, provided you have good men as workmen.

1570. Is there any other particular in which you would like to see the position of the engineers improved?—Yes. I think that they ought to have another step or a better position on board ship after a certain number of years' service; for instance, you go into the engineers' mess when you first join the service, and there you remain. Of course those men who are promoted to the rank of chief do get into the ward-room, but the greater part of the engineers are in the engineers' berth from the time that they enter the service until they go out of it, and they have no chance of rising or getting out of that which they first stepped into. I think that after a certain number of years they should go into the ward-room.

1571. Could they on their present pay, if they were married men with families, live at the same expense as the officers of the ward-room mess?—No, I think not.

1572. Where do you mess on board the "Fire Queen"?—We have a mess forward to ourselves. There is very good accommodation there.

1573. Who is in command of her?—Staff-commander Pounds.

1574. Do you mess with him?—No.

1575. Does he mess by himself?—Yes.

1576. (*Captain Dowell.*) Do you mess on board?—No.

1577. (*The Chairman.*) At what age do you think that a man should be promoted to the rank of a chief engineer?—To be both beneficial to the service and to the man it should be at 35 years of age, when they are young men of ability and fit for anything, you may say.

1578. Would you see any advantage in putting chief engineers into smaller ships?—You would be able to promote a greater number.

1579. It would increase the list of chief engineers, and proportionately reduce the list of engineers?—Yes.

1580. Where did you serve your time?—With the Great Eastern Railway, on their boats, and for some part of the time on their locomotives.

1581. Was that on the boats that run from Harwich to Antwerp?—Yes.

1582. Where did you serve your time as a workman?—With the Great Eastern Railway. We used to make all our own engines for the boats.

1583. You were in a factory on shore?—Yes.

1584. Were you ever at sea before you joined the service?—No.

1585. What age were you when you joined the service?—I think I was 19.

1586. Do you think it is a good system to throw open the entry of engineer students to anybody who chooses to come, whatever their social position may be?—I think it would be a very good thing to throw it open for competition outside, as well as for the students in the dockyards.

1587. At present anybody can come forward. Do you think that is a good system of getting engineer students?—No, I do not think it is. I think that they ought to be more carefully selected than they are, as I observe that you are liable to have all classes mixed up. I think that the social position ought to be raised in some way or the other.

1588. I understood you to say just now that you thought it would be a good thing to admit engineers from the private trade?—Yes.

1589. Would not there be a great difficulty in that? Looking to the theoretical education which is now

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required, you could not expect anybody from the outside to pass the same examination that the students pass, could you?—I do not see why they should not; I should think they would, provided you made it worth their while to come in.

1590. Would it not be a difficult thing for a man to provide at his own expense an education equal to that of engineer students, who are educated at the government expense?—You would get a much better class of men.

1591. What do you think ought to be the pay of engineers when they first join the service?—I should think at least 7s. 6d. or 8s. a-day.

1592. Do you say that in comparison with any other ranks in the service?—No.

1593. Why do you think that they should receive higher pay than other ranks in the service?—I merely take their pay on shore with what you require of them; you may say the education that you require them to have.

1594. Do not we give them that education gratuitously?—You do at the present time; but if you draw your engineers from the outside they will be all ready educated for you, and if you take them from the outside you must give them pay.

1595. Do you find any hardship in the way that the junior time is allowed to count for increase of pay to a chief engineer on retirement?—All time should count. I think it is only fair that it should be so.

1596. What should you propose as the pay to which an engineer should rise before he was promoted to the rank of chief?—I think 14s. a-day.

1597. Would you suggest any alteration in the position of a chief engineer or chief inspector of machinery?—I think if the chief engineers ranked higher than they do at present it would be better.

1598. Which do you think a chief engineer would rather have, increase of pay or increase of rank?—Increase of pay, I have no doubt; rank and position are of very little use without pay.

1599. Still it counts for something?—True, but it is not much use having a position unless you can keep it up.

1600. At the age of 45 you can retire on £130 a year?—Yes.

1601. Is the amount of your retirement regulated by the period of your service?—Up to a certain number of years.

1602. That is the maximum?—Yes.

1603. By "service" you mean sea service?—Yes.

1604. Supposing, as you suggest, arrangements were made to induce men of a higher class socially to enter the service, what inducement do you think should be offered to them; that is to say, taking your service from the beginning to the end?—In the first place, I would give them a better position on board ship.

1605. Begin with the engineer students?—If you get them from the outside you will enter them as men at 21 years of age, and they will be educated and competent to take charge of the engines of a ship. I would give them as engineers relative rank with a sub-lieutenant. They should be put in as commissioned officers in the first place, and be paid about eight shillings a-day; that pay would have to be increased after a certain number of years' service, and then, after a certain number of years, I would put them in the ward-room, and do away with the engineers mess altogether; that is to say, if you have talented men of a good social position.

1606. And you would promote them to the rank of chief engineer at 35 years of age?—Yes.

1607. And let all their time count for retirement?—Yes.

1608. What qualifications would you require of them at 21, when they entered the service?—The qualifications at the present time are very good, and I do not think that you would require more than you do now, but you want a superior class of men.

1609. With the same qualifications that we now have?—Yes, as to schooling.

1610. I mean all qualifications, practical knowledge as well?—Yes.

1611. Would you insist upon their having been at sea?—I would not, because they would get that experience; they would not be chiefs when they first entered, and they would have plenty of time to obtain the necessary experience.

1612. You say that they would be fit to take charge of engines?—Yes, they would be; when I entered the service I was obliged to take charge, and had never been afloat before.

1613. Is it not the case that they would very likely be sea sick?—I was sea sick, but I was on watch and there kept. I speak from my own experience. I have seen some people very bad, and give way to it when there was anybody else to do the work.

1614. Are you acquainted with the examination which the engineers have to pass at the naval college?—No.

1615. Do you think that we could call upon outsiders to pass an equally good examination?—I believe so.

1616. Where do you suppose these men of higher social position from the outside would obtain their practical knowledge?—In our large firms.

1617. Working in the shops?—Yes, as apprentices. I have known many of them.

1618. What number of years working in a firm would be necessary to obtain that knowledge?—Five years at least, I should say. Some would require longer than others; some take to the work quicker.

1619. And their education would go on at the same time?—Yes.

1620. Where do you imagine we should be able to get the increased number of engine-room artificers from, if we required them; what source?—We should get them from the outside, I think, if we held out inducements to them.

1621. What pay would you give them on first entry?—5s. 6d. or 6s.

1622. Were the engine-room artificers in the "Hercules" satisfied with their position?—No.

1623. Upon what points were they dissatisfied?—With the way in which they were put upon. They were quite alone by themselves, and yet they were interfered with in many ways. They said that they had no friends at all, and no one would look after them, and it was all up-hill work with them. They wanted a mess to themselves, right away from the ship's company. They are with the master-at-arms at the present time, which is a thing that they do not like at all.

1624. What would they like?—A mess to themselves.

1625. Where, in a ship like the "Hercules"?—Apart from the ship's company.

1626. Why do not they like messing with the master-at-arms?—They are always clashing. One has been to sea for some time, and the other has just entered the service, and they are put upon by the master-at-arms and ship's corporals, and interfered with too much.

1627. Are they not entirely under the chief engineer?—They should be; but you may say that they are under the master-at-arms while they are on the lower deck; they are subject to him there.

1628. Is there any means of putting them to mess on the engine-room flat?—In some vessels you might, but not in the "Hercules"; it is a great deal too warm. They had the stokers there, but they were obliged to take them out.

1629. Where do they mess in the "Hercules"?—On the mess deck.

1630. You mean that they had a table by themselves on the mess deck?—I believe they had, if I remember rightly.

1631. Did they clean their own mess, do you know?—They used to while I was there.

1632. Do not you find that after about a year's experience they settle down more comfortably?—Yes, they do settle down to a certain extent; but I know

it was a great sore with them, not having a place in which they could go and be comfortable amongst themselves; they did not seem to like it at all.

1633. Have you any engine-room artificers in the "Fire Queen"?—There is an engineer besides myself, that is all.

1634. Have you ever served in a small ship with engine-room artificers?—I have served in a small ship, but I have not had engine-room artificers.

1635. Do you think that a difference should be made in their pay according to their trade?—No; I do not see why it should be.

1636. You think that one trade is as valuable as the other?—You make them valuable, because, after they have been on board ship, you can make them useful to do anything; say, for instance, that a man is a blacksmith or a boilermaker when he first comes, but you can eventually get him to pack glands and do lots of odd jobs that a fitter would do, and it would clash amongst them if you made a difference in their pay; a boilermaker would not like to do fitter's work, and if a boilermaker packed glands that would be fitter's work, and there would be a drawback in having different rates of pay.

1637. Do you think it is a convenient arrangement that one engineer should have charge of all the auxiliary engines and water-tight doors and double bottoms?—Yes, I think so. I found that it worked very well in the "Hercules."

1638. And you would have him keep watch as well?—I think he ought not to. I kept my regular third watch (we were in three watches) for about a year and a-half. I made a complaint to the chief engineer and said that it was unfair, and then it was arranged that I should just keep the afternoon watch only.

1639. If you were allowed to retire from the service now, what would you do?—I would go into some private firm.

1640. As a marine engineer, or as a fitter in a shop?—I should go in most likely to take charge of pumping stations, or something of that kind.

1641. You would not go to sea?—Most likely not.

1642. Supposing that a general permission to retire was given to the whole of the engineers upon a scale of pay depending upon their length of service, do you think that a greater number of the older, or of the younger men would go?—I should think that the older ones would go, because their prospects are blighted. I am not an old man, but my prospects are, you may say, completely blighted, because I have nothing more to work for. I have been eight years an engineer, and having got that far I have stopped, and have nothing whatever further to think about, which, of course, is very discouraging.

1643. What could a chief engineer retire upon after five years' service?—I do not know.

1644. How much harbour service have you had?—About three or four months, I think.

1645. You have been on full pay the whole of your time?—Yes.

1646. (*Captain Dowell.*) You say that you would appoint four engineers and six artificers to the "Hercules," how would you apportion their duties?—The engineers have to keep watch in three or four watches, and the artificers also keep watch, but the engineers should not keep watch as at the present time in the engine-room, but should be answerable for its being kept; they should be under him and he should superintend.

1647. Would you think it necessary to place an engineer in entire charge of the double bottom?—Yes, it appeared to work very well in that case, the "Hercules," and also in the case of the "Invincible."

1648. With four engineers, would you have enough for that?—I should think so.

1649. You said that in the "Hercules" yourself and the carpenter divided the responsibility of the double bottom; I think that was your expression?—Yes.

1650. In what way did you divide the responsibility?—We used both of us to inspect the same parts.

1651. (*The Chairman.*) Is there an Admiralty circular upon that point?—Yes, that we are jointly to inspect it.

1652. (*Captain Dowell.*) Was it not considered that a certain part of the ship belonged more especially to the carpenter?—That was supposed to be so, but I went all over, and I used to say so and so looks in such and such a condition, and then he used to go and look at it.

1653. Did the carpenter ever go down in the engine-room?—Yes.

1654. Do you know what the proportion is between the pay of an engineer in the merchant service, and of an engineer in our service; do they get more or less in the merchant service?—An engineer in charge of a vessel gets more.

1655. How are the assistant engineers situated?—I think about the same rate; in some vessels they are getting very small pay indeed.

1656. You think that the number of engineers in the service might with advantage be reduced; have you any suggestion to make with regard to supplying their places in the event of war?—We should have the number made up with engine-room artificers.

1657. How would you provide for a larger number of ships in commission?—You would not require a much greater number of engineers, but you would require a greater number of artificers.

1658. (*The Chairman.*) Would you not have engineers in all ships?—Certainly.

1659. (*Captain Commerell.*) If you commission 250 pendants, and take them into the service, you would require 250 engineers in charge; from where would you get them?—You would almost require what you call a reserve, of course.

1660. (*Captain Dowell.*) Do you think that we should have any difficulty in obtaining engineers from the merchant service under those circumstances, and would they, do you think, be equal to the work?—I am afraid that the merchant service engineers would be completely adrift; it would be almost like taking landmen on board.

1661. Why?—Because there is so much routine. The men did come before, though I do not think they would again so easily. The merchant ships are all just about the same, but the engines of our large ships in the service are very complicated.

1662. (*Captain Commerell.*) Do you know how long the practical examination of the engineer students lasts, and is it in your opinion a satisfactory examination?—I do not know how long it lasts.

1663. Do you approve of the present system of education of the engineer students and is it your opinion that by that system good junior engineers are produced?—The education is very good except, as I have said, with regard to the mechanical abilities.

1664. Do you think that many engineers would avail themselves of the privilege of messing in the ward-room if it were accorded to them?—Yes, provided that their pay was increased.

1665. Would you advocate promotion from the engineers' list by seniority or selection?—By seniority.

1666. Supposing that promotion at the age of 35 was secured to engineers, what pay would you consider to be satisfactory at the time of their promotion?—I should say 12s. a day.

1667. Have you met with many leading stokers who would be fitted for engine-room artificers?—No.

1668. (*The Chairman.*) Or stoker mechanics?—No, I have not.

1669. (*Captain Commerell.*) Do you consider that the engine-room artificers should, if their pay be increased, be a superior class of men?—No. I think that the class of men we have at the present time is good enough. I have no fault to find with them.

1670. Do you think there would be any difficulty in obtaining engine-room artificers?—At the present rate of pay, and unless their position is altered, and they have better accommodation in the ships than they have at the present time, I think there will be a difficulty.

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1671. You do not anticipate any great difficulty in improving their position, so as to make them a contented class?—No, I do not anticipate any.

1672. I think you have given an opinion that you would keep them as engine-room artificers?—Yes.

1673. (*Captain Dowell.*) Do you think that the prospect of being made warrant officers would be an inducement to them?—Yes, it might be an inducement to them, but it would not be good for the service.

1674. Why would it not be good for the service?—In this way; warrant officers, of course, will not dirty their hands, and will not take their coats off to do any work, and I have no doubt that such would be the case with the engine-room artificers.

1675. Do you think that we should have a difficulty in obtaining them, and retaining them in the service with simply the increase of pay which you propose?—No, I think not.

1676. You think that they would re-enter after 10 years?—Yes, if they had a better position on board ship, and more accommodation; the accommodation is very bad indeed.

1677. I should like you to tell me in what way you would improve the position of the engine-room artificers, how you would put them to mess, where you would put them to sleep, and what arrangements

generally you would make for them?—I would give them a kind of rating between a chief petty officer and a warrant officer; give them a mess place away from the ship's company, and let them have a servant to clean out their mess when away on duty. At present they have to see that the cooking is got on with, and they have to clean their messes. Now if they had a servant to do that, I do not say such a servant as the engineers have, but a servant of some kind, it would be very much better; they are men that have been used to home comforts before they came into the service, and they are dissatisfied about those little things; they have to scrub their hammocks and so on, which is very disagreeable to them.

1678. Do you think that the engine-room artificers in the "Hercules" felt, as a grievance, the way in which they were mustered at divisions?—No, I do not think so, but I never asked them about it.

1679. Was it in your time that the engine-room artificers were put to mess together in a separate mess, with a stoker appointed to look after their mess and to clean it?—I cannot remember whether it was or not.

1680. (*The Chairman.*) Is there any further suggestion you would wish to offer to the Committee on any points connected with the engineers?—No, I think I have stated all that I can remember.

(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

WEDNESDAY, 20TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.
CAPTAIN WM. M. DOWELL, R.N., C.B.
CAPTAIN SIR JOHN E. COMMEREILL, R.N., K.C.B., *W.C.*
JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

CAPTAIN RICHARD VESSEY HAMILTON, R.N., C.B., *called and examined.*

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1681. (*The Chairman.*) What position are you now holding?—That of superintendent of Pembroke dockyard.

1682. What duties did you perform before that?—I was captain of the steam reserve at Devonport.

1683. Have you ever commanded an ironclad ship?—Yes, the "Achilles," coastguard ship, for three years.

1684. I think at Pembroke dockyard you have not any engineer students?—We have not.

1685. Either in the "Achilles" or in the steam reserve have you had any experience of engine-room artificers?—None in the "Achilles," but in the steam reserve we entered a good many while I was there.

1686. In what year did you first take command of the steam reserve?—From May, 1873, to March, 1875.

1687. Do you remember what number of engine-room artificers you had there generally?—Never more than eight or ten at a time disposable.

1688. Had you any difficulty in obtaining them when you required them?—At first very much; but latterly they began to drop in more readily. We were allowed to enter 15, but we never came up to the maximum number, speaking from recollection.

1689. Had you many offer themselves whom you considered unfit, and therefore did not enter?—I think

not many; most of ours were from the factory, and they of course, were all fit men.

1690. Do you remember in what trades there was the greatest difficulty in obtaining men?—The copper-smiths.

1691. How about the fitters and boilermakers?—We got them pretty freely; they were in the majority.

1692. Of the 15 that you were allowed to enter, was there a proportion fixed between the trades?—Yes, if possible there was a proportion, but it was left to us if we could not enter that proportion.

1693. Have you any idea what inducements chiefly operated to persuade men to leave the factory and become engine-room artificers?—The pension. I can give you one case in point particularly, of a very respectable young fellow, about 26, a married man with two children. We had had several of these people complaining that the treatment was different from that which they were led to expect when they joined, and I gave them two or three days to make up their minds, and to see the nature of the work before them. This man came, and I looked at him and said, "At your time of life, to take to the hardships of a sea life is more than we can expect. You will go away and grumble, and say that the treatment is different to that which you expected. Take 48 hours to consider: go on board ship, and see what the work is. You are

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a married man, and are accustomed to go home and get your meals prepared for you properly, clothes mended, &c., but on board ship you will have to do all that for yourself." Well, after two days he came back, and said that his mind was made up, and he would join. I asked him the reason, and he said it was because, at 45 years of age, he would get a pension of £50 a-year. The pension was the great thing that induced him to join. He had weighed all the disadvantages; he knew it was a great deal to give up a comfortable home, but then he had that pension of £50 a-year to look forward to at 45 years of age.

1694. He would not have got the pension under 20 years?—18 or 20 years.

1695. Do you remember what pay he had at the factory?—That I cannot tell, but it could be easily ascertained; not more than 5s. 6d. a-day, I think.

1696. For six days in the week?—Yes. I should say not more than that, speaking off-hand.

1697. Do you think that the pay which the engine-room artificers now receive is sufficient to induce them to re-enter after ten years' service?—I think that they are very well paid for their station in life. As far as I know, there are no difficulties about the pay on entering, although they know that they have no rise until after three years.

1698. I say after ten years?—No doubt; it would certainly be better to raise it after ten years.

1699. Those men are more valuable to us after ten years than at first?—Yes, much more so. When the men in the factory, who of course are never accustomed to a holiday, saw these men coming on shore and getting their ten days' leave, it set them going. They thought to themselves, there must be a little leisure in that service; and we got most of the men from the factory. Indeed, we had Mr. Nicolls, acting chief engineer, complain that we took away all his best hands.

1700. You consider that with the advantages we offer, namely, pension after a certain length of service, permanent employment, payment for seven days in the week instead of six, and their provisions on board, that their pay of 5s. a-day on entry is sufficient?—Yes.

1701. Did you send these men to sea soon after they joined?—There were several that we were obliged to send almost at once.

1702. Did you consider the men that you got were good workmen?—They were all very good workmen.

1703. If you had a job of work to do, would they do it better than the young engineers in the service; a practical piece of work I mean?—I suppose they would; although the young engineers, considering their Greenwich and Kensington training, did wonderfully well, practically; still the artificers would be better.

1704. Could you recommend any improvement in the condition of the engine-room artificers when they are afloat?—Nothing more than any other chief petty officer. I would not recommend anything beyond that, otherwise you would cause discontent with the other chief petty officers; the great secret with them is not to let them join under any misunderstanding; sooner or later we shall have to bring them up ourselves.

1705. Has it ever occurred to you that it would be to the advantage of the service if the number of engineers were reduced and the number of engine-room artificers increased?—Whether it will be an advantage or not I cannot say, but I look upon it as inevitable; as you improve the position of the engineers so you must decrease their numbers.

1706. Why?—On account of promotion. You cannot have more than a fixed number of chief engineers and senior officers without the promotion being disturbed. I know several very excellent engineers at Plymouth who would not take promotion. There is one in the hydraulic ship "Water Witch," Mr. Todner. I tried to get him out in the "London," factory ship, at Zanzibar, but he would not go; he is a first-class man in every way.

1707. If it be desirable or inevitable, as you say,

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that the list of engineers should be reduced, what would you suggest as a means of reducing it?—The only way is to bring up your own engine-room artificers.

1708. I mean to reduce the present list?—That is a question which I have not considered, and it requires a great deal of consideration. I have never gone into it. I suppose it could be done in the same way as they reduced our list, by pay and retirement.

1709. By advantageous retirement?—Yes.

1710. Do you think that we could at the present time obtain a large increase in the numbers of our engine-room artificers?—I should doubt it; we never came up to our maximum of 15 that we were allowed to keep on the books of "Indus."

1711. Should you suppose that the power of getting them depended upon the state of the iron trade in the private factories?—At Keyham we got none from the iron trade they all came from the factory; at Portsmouth they will be able to give you a better opinion, as they enter them there from the iron trade.

1712. Do you remember whether the engine-room artificers whom you entered from the factory were men who had been brought up as boys in the factory?—I cannot say as to that, but I imagine so; most of the factory men at Keyham have joined as boys.

1713. I understood you to say that in the present improved condition of the engineers it was inevitable that their number must be reduced?—Yes, I think so.

1714. There is another alternative. If the education of the engineers were very much modified, and we made them as good practical workmen as the engine-room artificers, that might be a means of retaining the present engineers in the service, but would you see that done?—I am not quite sure that they are not a little over educated at the present time. I think they are. I must say this, that in talking the matter over with Mr. Covey, I found that he was rather of the same opinion, but he says that he has no fault to find with their practical work; notwithstanding their work at Greenwich and Kensington, when put on board the "Calliope" they are quite equal to doing any job expected of them.

1715. Do you consider that if we increase the number of engine-room artificers that we have in our ships there must always be a small body of well-educated men over them as officers of the engine-room?—Yes, I think so; certainly in all large ships. In some ships there is a quartermaster in charge of the watch, but he is a man of 10 years' experience at least; we were frequently obliged to put engine-room artificers who had never been to sea in a ship, and they were not fit to keep watch; had they been like a quartermaster with ten years' experience we could have given them charge in a small craft.

1716. Had you ever to conduct the examinations of engineer students at the dockyard?—Not to conduct them, but I was present at them.

1717. The final examination?—Yes, the final examination before they go to Greenwich.

1718. Under that regulation (*handing a circular to the witness, see Appendix 3*)?—Yes.

1719. Could you tell the Committee what sort of examination they passed in practical work. I do not wish you to go into details, but did it last hours or days, or what?—The practical examination, I think, lasted a week; the first time (I was twice present at the examinations) I do not think that there was any practical examination. Mr. Trickett was in charge of the first, and Mr. Nicolls was in charge of the second examination, and he set them a hard course of practical examination under the charge of a foreman, himself and the committee visiting them occasionally.

1720. That was by the chief engineer of the dockyard?—Yes.

1721. By these regulations it is to be conducted by the officers of the reserve?—Yes; then the chief engineer of the dockyard was the leading officer.

1722. The object of that regulation with regard to

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their examination is, that the students shall be examined by others than those who taught them?—Yes. I of course looked to the inspector of machinery to give me his opinion upon the point, and the chief engineer, and last time we had Mr. Moore, the chief engineer of the "Black Prince," and an excellent officer, with Mr. Covey.

1723. Were they satisfied with the practical work?—There were of course exceptions, but, taking the students as a body, they were better satisfied last time than the first.

1724. Do you think, on the whole, that the provisions of that regulation tend to improve their practical instruction in the dockyard?—They have not got enough supervision, and if they are inclined to be idle they can be.

1725. Had you ever anything to do with the selection of candidates for entry as engineer students?—No.

1726. Are you aware of how they were selected?—I think it is done at head quarters. I thought it depended upon their examinations.

1727. Entirely?—Yes.

1728. That no selection was made of the candidates?—No, that it depended upon their examination.

1729. Are you aware of the class of men who enter as engineer students; the class of society from which they come?—From all classes. I have known the sons of privates in the marines, and of workmen in the dockyard, and dockyard labourers, enter.

1730. In fact no class is excluded?—No, no class is excluded by the competition examination.

1731. No social class?—No, no social class.

1732. Do you think it is desirable to keep up such a system now that we are endeavouring to improve the position of the engineers?—You may give them pay and rank, but you never can improve their social position under those conditions; you cannot improve their private social position.

1733. Do you think that if the number of engineer students entered be reduced considerably, it would be desirable, while keeping up a strict examination, that they should be nominated by the Board of Admiralty, the same as in the case of all other officers in the service?—Certainly. Young civil engineers generally come from a tolerably well-to-do class; the young civil engineer is brought up and has to go through the mill, the same as Stephenson had to do, for instance.

1734. Do you think that the position of engineers might in future be such that gentlemen's sons would not object to come into the service?—It might be made such; but it is a difficult matter, no doubt. I do not think that the son of any gentleman would come into the service if he could get anything else, because there must be a considerable amount of manual and dirty work; let you do what you can, you cannot avoid a great deal of that.

1735. Were you thrown much amongst the young engineer students in the dockyard during your service in the steam reserve?—Not very much, except during the examination and seeing them go round the yard; some were attentive, and others were like what most boys are like. There is one point which is, I think, very important with regard to the engineer students; after they come from Greenwich, where you give them a comfortable mess, which is this, that when they go to Keyham they are left to go and lodge where they like. Now I think that there ought to be a mess provided for them, in order to improve them socially.

1736. After they come from Greenwich?—Yes; before that I have nothing to say.

1737. (Captain Dowell.) Then they are engineer officers?—Yes.

1738. (The Chairman.) Do you think it would be desirable, if it could be done, to form a mess at each dockyard to which the engineers in the reserve and the engineer students might belong?—Certainly; I am strong upon the point of providing a mess for them after they come from Greenwich; ours mostly belong to Plymouth, and as I have said, there are amongst

them a great many sons of privates in the marine and dockyard labourers. It would be better to send them to Portsmouth.

1739. Do you think that the experience which the young engineers have at Greenwich in forming a mess by themselves would enable them to conduct a mess at the different ports by themselves?—I think I would, under the supervision of the captain of the steam reserve, and, of course, the chief inspector of machinery.

1740. Would you recommend that an engineer should be promoted to the rank of chief engineer by seniority or selection, or by a proportion of each?—I should most certainly say by selection, but, perhaps a portion by seniority; not more than one-half by seniority.

1741. Have you ever considered what you think would be a suitable age for a man to be promoted to the rank of chief engineer; at present it is about the age of 42?—That is too old, it should not be beyond 35; very few will take it when beyond 40 years of age.

1742. Are you aware of the pay which the engineers receive?—Not off-hand.

1743. An engineer now remains until he has attained the age of 42 before he is promoted to the rank of chief engineer; his pay then is 10s. per day; do you think that that pay should be progressive, or do you think that is sufficient for them?—It is not sufficient if they are promoted at that age, but it would be sufficient if they were promoted at the age of 30. In comparison with the other classes in the service, they are better off, as they are never on half-pay. If they are on harbour pay for three months they grumble dreadfully.

1744. If the promotion to the rank of chief engineer were much more rapid, that would be equivalent to an increase of pay?—Yes, it would be an increase of pay; at the average rate of promotion now they are under-paid. Mr. Todner gets 11s. a-day, 10s. a-day for service and 1s. a-day charge money. He would get the same pay as he receives now if he were promoted.

1745. Are you aware of what the half-pay of a chief engineer is, when promoted at the age of 42?—6s. a-day.

1746. Do you consider that that would be sufficient, supposing they were promoted earlier, bearing in mind that their pay is progressive according to their service?—Yes, of course, half-pay is not sufficient for anybody; but I do not see that they are particularly worse off than anybody else. I am now speaking of them in comparison with other classes, but half-pay is insufficient in itself.

1747. How many engineers had you in the "Achilles"?—Four and a chief was our harbour coastguard complement.

1748. And the sea going complement?—Was a chief and seven engineers; we had two in a watch, and one kept the accounts.

1749. On the understanding that the engine-room artificers were increased in number in that ship, what would be the smallest number of engineers that ought to be in her, do you think?—A chief and four engineers.

1750. (Mr. Wright.) For her sea-going complement?—Yes, that ought to be the least number.

1751. (Captain Dowell.) And how many engine-room artificers?—I should think, speaking off-hand, at least six or seven engine-room artificers, so as to have a spare one; two in a watch at least.

1752. (The Chairman.) What is the nominal horsepower of the "Achilles"?—1250; the engines of the "Achilles" are very easily handled and managed.

1753. Her engines are simple?—Yes, the "Amethyst" and "Modeste," with compound engines, will require as many engineers to handle them as the "Achilles." I think, with regard to the number of engineers, it is hardly fair to take a particular ship now, because the compound engines are so very complicated. I was particularly struck with the engines of the "Modeste" and "Amethyst," the eng-

neer had to climb over from one place to another, and could not stand upright; strictly speaking, they ought to have two engineers in a watch.

1754. Should you think that if a certain complement of engineers and engine-room artificers be found sufficient to maintain the engines properly during a three years' commission, that if any difference be made in the proportion of engineers to engine-room artificers, the total number of the complement should remain the same?—I should think so.

1755. Have you ever considered what would probably be the best means of recruiting for the engineers in time of war, and adding largely to their numbers?—We should have to do as we did before in the Baltic during the Crimean war. I do not see any way of increasing them suddenly; you cannot take them from the merchant service, because the merchant service would want to increase its number suddenly as well as ourselves.

1756. I expect it would be reduced in the event of a maritime war; a good many steamers would be thrown out of work?—We should turn the steamers into war vessels for the suppression of privateering.

1757. Have you come in contact with the engineers in the merchant service at all?—Very often.

1758. Are you aware of their relative pay and position as compared with our engineers?—I should say it was very inferior in the merchant service, except in the case of chief engineers. The juniors are very little better than engine-room artificers.

1759. Do you approve of the system of educating our own engineers for the navy?—Certainly.

1760. What plan would you propose for obtaining engine-room artificers in large numbers?—To bring them up ourselves in the dockyard and steam reserve factories.

1761. Would you be inclined to bind them as apprentices the same as dockyard apprentices, or, bearing in mind that that is not done in the factories, would you take the chance of getting them from the factory boys?—I would bind them the same as we do our own boys.

1762. (*Captain Dowell.*) Is there any arrangement between the dockyards by which the vacancies in one can be supplied by the other, or have you, whenever there has been any difficulty in obtaining engine-room artificers, applied to other dockyards to know whether they had supernumeraries on the list?—We applied to Portsmouth. With regard to the engine-room artificers connected with the fleet, there is a regular communication kept up.

1763. When you required them, and could not get them, did you inquire if there were any applicants?—No.

1764. Do you think it would be a good thing to establish a system by which they could keep a list of applicants?—Yes. Portsmouth did not supply at one time as many as we did, and applied to us when short; as a rule we supplied them. When they went to the manufacturing districts, I believe, they obtained more than we did.

1765. (*The Chairman.*) Are you aware whether the advantages offered to engine-room artificers are well circulated amongst the private factories in the country?—Yes. I know it was done not long before I left the Reserve.

1766. (*Captain Dowell.*) Now at Chatham they have more than they require?—Indeed; perhaps at Plymouth they now have; I do not know. 15 is a very small number, and that was our maximum number allowed to be entered.

1767. The reason you said it would be better to educate them was, because you thought you could not get them, I suppose?—I think that they join the service when too old to readily take to a sea life.

1768. Supposing they entered them at the dockyard, they would not go to sea until they were qualified?—No; they now enter at 26, on an average; we have got several who are 30, and on several occasions we have got them over 35.

1769. (*The Chairman.*) Have you had intercourse

with any of the engine-room artificers after they have returned from a seagoing ship?—None that I have entered myself, at all events; others have come back to us in the reserve, but I have never questioned them.

1770. Have you any suggestions to offer with regard to an improvement in the position of the engineers and engine-room artificers beyond those points which we have already discussed?—I do not think so; nothing occurs to me just now.

1771. (*Captain Dowell.*) You do not know anything about the messes of the engine-room artificers, I presume?—No.

1772. You did not have any?—No. I never had practical dealings with them.

1773. (*Captain Commerell.*) I do not think that the engine-room artificers had come fully into play when you were at sea?—No; the great complaint is that they are placed in a worse position than the other chief petty officers; they were employed in the engine-room, and could not leave it when the pipe went for dinner, and no one was left to look after the mess, and they had to do it all themselves. Those complaints were in small craft, but they were more abstract theories than actual complaints, I think.

1774. (*Captain Dowell.*) Who had charge of the double bottom in the "Achilles"?—The engineer.

1775. Which engineer?—The chief engineer was responsible.

1776. But had you anybody specially told off for that duty?—The senior engineer under the chief engineer. I think, speaking off hand, they were told off for different parts of the vessel.

1777. How did the duties go on between them and the carpenter?—The carpenter went round, as directed by the instructions, with the chief engineer, and never interfered at any other time.

1778. Did you find that work satisfactorily?—Yes; at the same time I think myself that the chief engineer ought to be the responsible person. He is the real working person, and ought to be made responsible.

1779. (*The Chairman.*) Fore and aft the ship?—All inside the engine room. With regard to the other parts I do not speak positively, but should say the carpenter ought to be in charge.

1780. (*Captain Commerell.*) Do you think it would be advisable that an artificer should be employed in visiting the different places for the purpose of recruiting the engine-room artificers from the manufacturing districts, provided we wish to enter a larger number?—If found necessary.

1781. Do you think that in the manufacturing districts they are thoroughly aware that we require engine-room artificers, and of the terms we offer?—Judging from Portsmouth I should say yes; at Keyham we had nothing to do with them; they are aware now.

1782. Do you think that when the assistant engineers first go to sea they are thoroughly up in the practical working of the engines?—They are not fit to be placed in charge of the engines, nor to take charge of a watch.

1783. Is there anything which you could recommend in the education of the engineer students, or any particular in which you think they fall short?—They have no opportunity of acquiring a knowledge of engines beyond that afforded by the steam reserve trials; they are sent out on those occasions, but a young fellow cannot pick up much, he can only look on; they ought to be specially sent out in a vessel.

1784. Do you think that the young engineers in the steam reserve could be employed with advantage under a really practical engineer in tugs and smaller vessels?—Yes, they are occasionally sent in the tugs, but not as a rule.

1785. It does not matter who starts the engine, so long as they are there to see it done?—Tugs are all paddles you know, we have not a screw. You have to train young lieutenants to take charge of a watch, and the chief engineer has to train the young engineers. I would rather myself place an experienced

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engine-room artificer in charge of a watch than a young engineer in his first essay at sea.

1786. Do you think that, as a rule, an engine-room artificer, after a year's service at sea, is thoroughly capable of taking charge of the stokehold?—If the ship is a good deal at sea; it depends so much upon that. If he is in a small craft, certainly, but if in the "Achilles," no. It depends so much upon the actual working; but I think that both engine-room artificers and young engineers, on first entry, ought to have a vessel set apart for them for training to go out in.

1787. Do you think that in small vessels engine-room artificers, when they have been at sea three years, are capable of taking charge of the engines?—Yes, I think they are, as a rule; they have only two engineers, and must do it.

1788. Would you suggest any difference of pay between the class of engine fitters, engine boilermakers, and engine coppersmiths?—I do not think so; certainly not, with the exception of the coppersmith, and that because coppersmiths are so difficult to be got. It is the most difficult trade to get, and it is the only one in which I would make any difference, otherwise you would have this happening: if you make the pay of one trade a little more than that of another, you would have boilermakers trying to pass for fitters, and fitters for coppersmiths, and so on, and that would create a difficulty.

1789. Have you seen many leading stokers and stoker mechanics?—Not very many.

1790. Do you think that many of them could pass for engine-room artificers?—I would prefer an engine-room artificer from a leading stoker, if I could get him; but the majority of engineers, so far as my experience goes, are against it. They say that they are not mechanics, and that they would not like to trust a leading stoker as a boilermaker. During the time that I was at Keyham, we passed several leading stokers and several armourers.

1791. Do you think that many of our armourers could pass for engine-room artificers?—Yes, but they have no knowledge of the engine; that is the objection to them. When I was at Keyham several passed, and I represented that it was not advisable to take them. They know perhaps the mechanical duties, but nothing about the engine-room. I had to send one of the armourers into a small craft to take charge of the watch, but he had never been in an engine-room in his life. There is now an order not to take armourers.

1792. (*The Chairman.*) Is there not a clause in the instructions for the entry of engine-room artificers, that they should know the parts of an engine?—They have a certain amount of theoretical knowledge; they learn enough to pass a *visa voce* examination; but I rather think that some of the captains and engineers objected to them, if I do not mistake.

1793. (*Mr. Wright.*) Do you know whether the arrangement in the "Fantome" of two engineers and two artificers was found to work satisfactorily?—It answered satisfactorily so far as being in England was concerned, but whether it does abroad, I cannot say.

(*The witness withdrew.*)

RICHARD SAMPSON, Esq., R.N. called and examined.

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1803. (*The Chairman.*) Where are you serving now?—In the channel squadron, the "Minotaur."

1804. As inspector of machinery afloat?—Yes.

1805. How long have you served as such?—From June 1874, in the channel squadron.

1806. What was your appointment before that?—My last appointment before that, was five weeks at Keyham with Captain Hamilton in the steam reserve, then going out to Bombay with the "Euphrates" on special trials of coal; before that I went to Hong Kong dockyard, but was invalided from there.

1794. If the number of engineers were to be considerably reduced in large ships, would you still propose that they should have a separate mess, or that they should join the ward or gun-room messes, according to their standing in the service?—I do not think, with the present class, it would be advisable to have them in the gun-room mess; they had much better join the ward-room mess. However, there is no doubt about it, that the abolition of the mess is one of those things which is inevitable, and must be done sooner or later.

1795. (*The Chairman.*) Do you think it might be desirable, if it could be managed, that the engineers in the service should be given a cabin with the berth places in it?—I think, for all men over a certain age, it would be better.

1796. Instead of sleeping in a hammock?—Yes, a cabin with three berths. I have said that very often, but have always had the idea scouted.

1797. Has it ever occurred to you that in our iron ships we might dispense with the carpenter, having a chief carpenter's mate, with his crew under him, as at present, and that the staff of engineers and engine-room artificers should have charge of the whole of the iron hull of the ship?—I should be very sorry to do away with the carpenter, besides the iron there is plenty of work for him as long as the ships are fitted with boats.

1798. The masts are of iron, you know?—But there are the spars. I know that in the "Achilles" the carpenter always had his hands full, and when we got a bad carpenter we were all adrift. I would rather do away with the gunner or boatswain than the carpenter. I could do the work of both of them, but not the carpenter's work, nor did I ever find an officer who could.

1799. Looking at our present system of entering engineers and training them, do you think it would be desirable to obtain them from the outside if they could pass our examinations on entry; I do not mean as students, but on entry into the service as engineers?—Not unless it was forced upon us, and we could not enter enough without it.

1800. Then you fully agree with our present system of training engineers?—Certainly; there is no doubt that the engineer class has improved most materially during the last few years.

1801. Do you suppose that the improvement in the condition of the engineers of late years, has arisen in a great measure from the system of training and education laid down in the year 1863?—I do, certainly.

1802. (*Captain Commerell.*) Have you found in the steam reserve that the engineer students keep themselves aloof from the other factory working men?—I cannot say. I should rather imagine that they were thrown too much with them, and not kept separate; but they did not come much under me. They are not looked after enough, in my opinion; there is only one leading man appointed, and that is not sufficient to look after them properly.

1807. Have you been chief engineer of an ironclad ship?—I was chief engineer of the "Prince Consort," from 1863 to 1868. I was there when she came round from Pembroke dock to Devonport.

1808. Have you had much experience of the engine-room artificers in the service?—I have seen more of them in the channel fleet, and in the "Euphrates," than I have at any other time. I have heard more about them than seen them.

1809. What is your opinion about their qualifications as a body?—They have very fair qualifications

as a body; perhaps where I saw most of them was at Gibraltar. The other day we were obliged to make a coupling for the "Jumna's" screw-shaft, and we were obliged to call upon the artificers for assistance, as there was no assistance to be obtained there beyond that of the convicts. In the channel fleet we have had one or two very good men indeed, but the others have been only moderate.

1810. Did the screw-shaft break?—There was a flaw in it of about 2 feet 6 inches which ran in a direct line with the shaft. Each piece of the coupling when it came out of the sand weighed 22 cwt.

1811. Was it brass?—Cast iron. We had another job too; the superheater inlet valve-box of H.M.S. "Sultan" broke, and we cast one for it. With regard to the "Jumna" business, we had to call in an engineer to do the best of the work, the boring, and screwing the bolts, and so on. We might have had one artificer that could have done it, but we could not put our hands upon him at the moment, so we had to call in an engineer to bore the coupling out.

1812. Do you find that the old engineer officers are better practical workmen than the younger ones?—Yes, I think so.

1813. What trade were those engine-room artificers who did their work so well, fitters or moulders?—The one I speak of was a fitter, and the next best that I know of at his trade was a boilermaker; the boilermakers are the best as a rule; and, I suppose, that is because they can pick up that business a little quicker than the fitting business.

1814. How many engine-room artificers have you in the channel squadron?—21 is the number we have, but then we have one allowed to the complement (which is 20) for the general work of the squadron. They do not run in the right proportion I think. We have in the channel fleet now, seven fitters, five boilermakers, two blacksmiths, three enginesmiths, two coppersmiths, and one patternmaker. I think that they ought to run about six fitters to three boilermakers, and one of other trades, such as coppersmith or enginesmith.

1815. In the whole fleet?—Yes.

1816. Have you coppersmiths?—Yes.

1817. Do they know their work well?—Yes; the one that we have for the channel fleet is a very good man, and served his time in Portsmouth factory.

1818. Are you short of your complement at all?—I believe that the "Black Prince" has only two instead of three; but it will be made right before she goes away, no doubt.

1819. Have you ever known any difficulty in filling up the complement of engine-room artificers?—I have not felt it in the channel squadron.

1820. Do you think from what you know of them that the best men, after they shall have completed their 10 years' service, will be likely to remain in the service under the present regulations?—I do not think that they will, as I think that there is a certain amount of dissatisfaction amongst the men at the treatment they receive?—It is like serving another apprenticeship to get into the ways of a ship, the messing and so on.

1821. Where do they mess in the "Minotaur"?—They have got a little mess to themselves on the engine-room flat, or the flat next the engine-room flat; it is not a very nice place, nor is it fitted up as well as it might be.

1822. Is it their own wish to be there by themselves?—Yes, I think so.

1823. What are the points of which they complain?—They consider that they are interfered with a great deal by the master-at-arms. I mean in the service generally, because they are very often employed in the engine-room when they cannot be in the mess to clean it.

1824. Then they do clean their own mess?—Yes; the best regulation that I have seen, with one exception, is in the "Sultan"; there they have a nice little

place railed off; it is not very large, but it is comfortable, and is railed off like a church pew.

1825. Where is it?—It is on the starboard side of the engine-room flat; in her they have a second-class stoker to attend upon them, but that is too expensive a job; if they could have a servant it would be better, and I do not see why they should not have one at 1s. 1d. a-day, the same as the warrant officers. Their hammocks are another difficulty. The copper-smith I spoke of paid 5s. a-month for having his hammock cared for, and then it is only on sufferance; he is answerable for it afterwards if there should be any thing wrong with it. I think if they could have the option of paying a hammockman the same as the junior engineers, it would be as well.

1826. The junior engineers can employ one?—Yes.

1827. And you think that the engine-room artificers might have the same sort of thing?—Yes.

1828. Could the servant scrub their hammocks for them?—I do not think that would do; it would be too much for him to do in the time; they must be done in a given time. There is a case of a man paying 5s., but I am told that others pay 1s., and some 6d., for the scrubbing, and then they take it up and down themselves. This, however, is always staring them in the face, namely, that if dirty or not taken in at the proper time, they are responsible; but with the officers' hammockmen, they are the responsible parties.

1829. Would it not be a very easy thing for them to learn to take their hammocks up and down, and scrub them?—They do not fall into that well. Another thing which I have heard, and which I believe is pretty correct, is with regard to the trades-unions; they look upon it that a man who comes into the service as an engine-room artificer is degrading himself.

1830. But the trades'-union man has no power over them?—I do not know how far their power extends. I do not know that they could deprive them of any of the privileges, but they do not like it. There is a man now working at the factory at Portsmouth who bought his discharge from the service, an engine-room artificer, and that I believe was principally on account of the discomfort he was subject to; that was about two years and nine months ago.

1831. In what ship was that man?—In the "Resistance," just before she was in the coastguard. He got his dislike I think from the "Caledonia." I could not say whether it was in the coastguard or in the Mediterranean. The men complain too of their chests; that was one of the complaints that they wanted me to listen to when I went out in the "Euphrates." I only went out on special duty, and therefore I could only tell them to be patient.

1832. (*Mr Wright.*) Did they want a larger chest?—Yes; the size had been reduced I believe from time to time; the dimensions that they wanted were three feet four inches long, by two feet by two feet.

1833. (*The Chairman.*) Do the engine-room artificers provide their own tools?—No.

1834. They do not provide any tools at all?—No.

1835. Do you think that their pay on first entry is sufficient?—I think that you ought to increase it a little on first entry, in order to induce them to come.

1836. But supposing there is no difficulty in getting the right sort of men and good mechanics at the present rate of pay?—I should think that they would not stop long if they were good men; you must make it worth their while in both money and comfort.

1837. In the meantime, we have had men since the year 1868 who have nearly completed their 10 years' service. What pay would you recommend that they should start with?—They now get 5s. on entry; I would give them 5s. 6d. on entry, and I would let them go up after 15 to 20 years' service to what our first assistant is getting now, viz., about 7s. 6d. a-day. Of course that must be your guide; it would not do to let them run a-head of that, the one must guide the other in that respect I think; that I think would simplify the matter a good deal. I hear them complain about their uniform; they would like a single-

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breasted frockcoat instead of a jacket; otherwise they are satisfied I believe. With regard to their chests, they say that the reason they ask for the larger size is because they must, of necessity, have more working dresses than the general run of chief petty officers, as they have a great deal of dirty work to do. If you want a better class of men as engine-room artificers you must bid for them by offering little comforts, and so on.

1838. Do you think that there is great room for improvement in the position of the engine-room artificers by giving them a progressive rate of pay?—Yes, decidedly.

1839. Supposing that their pay on entry was not increased, yet if they could look forward to a progressive increase it would be a great advantage, would it not?—No doubt.

1840. Are you aware what wages the men get at the same trade when they join us?—I saw a man working on board the "Alberta" whose face I knew; he was a boilermaker; and I knew I had met him somewhere. I said to him "Where have I met you?" and he replied "in the 'Euphrates.'" I was an engine-room artificer in her when you went out in her to Bombay." His name was Wilson. I said to him "Have you left the service," and he said that he had been invalided out of it. I said "What pay do you get now," and he told me 5s. 6d. a-day.

1841. Where was that?—At the factory at Portsmouth; he was on board the "Alberta."

1842. (Captain Dowell.) What was his pay as an engine-room artificer?—5s. 9d. a-day after the first three years.

1843. (The Chairman.) That was for seven days in the week, and he got 5s. 6d. for six days in the week, and has lost his chance of pension, permanent employment, and rations. Are not those considerable advantages to be taken into consideration?—Yes, they are, but they weigh against them that they get a great deal of overtime, three or four days a-week, and are always at home.

1844. In our own factories?—I am not in a position to say that they do, but I believe they often do, though I do not know how often.

1845. How many engineers have you in the "Minotaur"?—Seven, and a chief.

1846. And how many engine-room artificers?—Three belonging to the ship and one extra for the squadron, the coppersmith that I spoke to you about. The original complement of those ships would be ten, now it is seven engineer officers and three engine-room artificers.

1847. Are they in three watches or four?—The engineer officers had been in four in the "Agincourt," but at the last of the commission there was some little difference of opinion with the captain; he did not think it right that the engine-room artificers should be in charge of the stokehold or of the boilers, and he ordered otherwise.

1848. When they were in four watches an engine-room artificer was in charge of the stokehold?—Yes.

1849. Do you see any objection to that yourself?—Not the least; in fact it is a thing that you must do if you want to bring these men on; it is no use giving them divided responsibility, like putting an engineer over them in the stokehold, they would not learn anything; the stokehold is their place, and it seems unnecessary that an engineer of several years' standing should be keeping watch there.

1850. Have you had any experience in small vessels of the engine-room artificers being in charge of the engine-room?—I could not say anything about that.

1851. Are you satisfied with the present rate of promotion in the engineer branch, and do you think that it is satisfactory for the service?—It is most unsatisfactory, I think.

1852. How would you improve it?—I would make it worth the while of some of the senior ones now over 40 years of age to retire, and I think we might fairly fill up their places with engine-room artificers, that is, of course, if we improve the class

of engine-room artificers. If you want to go on much further with that, then you ought to have a better class of men, because I cannot get it out of my mind that we had to call in an engineer officer to do work that ought to have been done by an engine-room artificer.

1853. Do you consider that, as a body, the engineers are better practical workmen than the engine-room artificers you have come across; that is to say, the junior half of the engineers and the men we have to look to as coming forward?—I should say of the whole that the engineers who are coming forward are the best, decidedly.

1854. How do you account for that?—On account of the sources from which they are taken; some of the engine-room artificers we are getting have only been petty officers; many of them have not served their regular time.

1855. Have they been stokers?—Yes, and have picked up the work in that way. Some of them are very indifferent, and I believe there are some in the channel fleet; I have heard so.

1856. You consider that if we reduce the number of engineers and increase the number artificers, we must be very careful about the men we take, and only enter those who are thoroughly good workmen?—Quite so, and then we might reduce the number of engineers with great advantage to the service.

1857. What staff, altogether, of engineers would you recommend in a ship of the "Minotaur" class?—I would have half of each; five engineers and five artificers, I think, would work very well at present. I mean 10 without the chief engineer, that is, a chief and five engineers and five artificers.

1858. You say that you would offer inducement for the older engineers to retire by way of reducing the list?—Yes.

1859. Is there any other recommendation you could offer as regards promotion?—I think that we might very well increase the list of chief engineers, because I do not think that it is properly arranged at all now. You now appoint them according to nominal horse-power, which is a thing of the past; they ought to be appointed according to the indicated horse-power. I should think that a vessel of about 700 indicated horse-power ought to carry a chief engineer.

1860. (Captain Commerell.) What would that be nominal?—It might be 180.

1861. (The Chairman.) Would you recommend any alteration in the pay of chief engineers and engineers?—Yes, I think that the engineers are very badly paid, indeed, and I think that their pay ought to be progressive.

1862. Have you formed any idea as to what you would suggest?—I would do away with the assistant-engineers entirely and have one list of engineers, and then the junior ones should have what the first assistant has, 7s. 6d., I think it is; after a man has served 18 years he should receive 14s. a-day; that would not be a bit too much for him; that is service in all ranks. Then again, there is a great sacrifice of junior time; I cannot count any of my third engineer's time, which is three years.

1863. You cannot count your junior time for either increase of pay or retirement?—Not at all, it is entirely thrown away; however, mine is, if anything, rather a favourable case. I hear of some men who have got six years as third.

1864. For what reason would you think that the junior engineers, when they first join, should have 7s. 6d.?—Because I think that 6s. a day is starvation pay.

1865. Is it more so than in the case of other ranks, where they have been educating themselves and finding everything up to that time?—They get an allowance from their friends; but I look upon it that the duties of engineers are more onerous and difficult now than was formerly the case. The engine-room takes a good bit of his life off, particularly if he be in the tropics.

1866. (*Captain Commerell.*) Do they get increased pay in the tropics?—That has been done away with now for years; the artificers do not get it now.

1867. (*The Chairman.*) With the exception of the troopships, are the ships very much under steam in the tropics?—We had a good bit of steaming when I was on the coast of Africa. I know an engineer's wife who has five children, and lets lodgings in order to keep the elder ones at school. I do not know what that engineer's standing is.

1868. Do not you think that engineers have great advantages in not being placed on half-pay?—I do not, I have got about four years half-pay time. I had 16 months half-pay time as a chief engineer; that was in 1857 and 1858, when they took chief engineers out of sloops. I was in the "Stromboli."

1869. You consider that 16 months' half-pay time as a chief engineer is really a large amount?—I do; I was on 5s. a day for all those 16 months. Since I have been an inspector, I have been employed about half my time. I was promoted in 1870, and in August, 1875, I had about two years and seven months' full pay time.

1870. (*Captain Commerell.*) What is your half-pay?—16s. a-day as inspector; my full pay is 25s., and if I served on for 10 years it does not increase a bit. I think that it ought to increase after 24 years' total service 1s. a-day, until a certain maximum is reached.

1871. What should that maximum be?—I think we ought to go up to 84s. a-day at the least. If you come to comparisons, see how unfavourably we compare with other civil branches of the service; a paymaster can get 33s. a-day. I look upon my rank as corresponding with that of a deputy inspector-general, and he commences at 31s. a-day, and after 22 years' service he gets 1s. a-day extra up to 38s. In the case of a chief engineer, if he happens to be in a flag ship, he has been known to receive 30s., 22s. a-day the maximum pay, 3s. a-day charge money, and 5s. a-day for being in the flag ship; and the pay of many chief engineers is now up to that of inspectors when they get 3s. a-day charge money. There is another little thing that I have been deprived of this last week, that I had been enjoying all the time I was in the "Agincourt," and also my predecessor, and that is the cabin furniture, such as a few chairs and a carpet, and so on. A commander gets so much furniture allowed him.

1872. Under what regulation is that?—Admirals, captains, and commanders.

1873. It does not include inspectors of machinery?—No.

1874. Have you made any representation about it?—I wrote a letter about it, and have received an answer, although not officially yet, that it is not allowed. They have refused the secretary as well, although he had it in the "Minotaur," in 1869 or 1870. Mr. Oliver told me the other day, that when he fitted out the "Minotaur," in May 1869, there was an order to give him the furniture in accordance with that of a captain of a corvette, but he said he did not want all that, and only took what he wanted. The staff commander has been enjoying a similar privilege, but they have now taken it from him. All that I am allowed now is a knee-hole writing table. I intend to write another letter about it when I get my answer officially, as I think to give me a rank and not the little privileges attending that rank is not fair.

1875. Are you aware of the regulations for the entry of engineer students in the dockyards now, how they are selected for entry?—I think that they have only to apply to the admiral superintendent of the yard to have their names put down on the list.

1876. And they have to go up for competitive examination?—Yes.

1877. Do you think that is a good system?—I do not, indeed.

1878. What would you suggest in its place?—I would nominate them in the same way as other

officers are nominated, paying due regard to their respectability, because there can be no question from the little I know about it that that is not well secured.

1879. (*The Chairman.*) Will you look at that list (*handing the same to the witness*), which shows the parentage of the entries during the last three years. Do you think that if nominations were given by the admiralty, we should get men from a superior social class?—I do.

1880. In the event of an improvement in their condition being made?—Yes. I do not think you would get many at the present rate of 6s. a-day. I cannot see why they should not pass a civil service examination. I think that would tend to bring them up a little bit; they might answer questions supplied by the Civil Service Commissioners, but not have the expense of coming up to London.

1881. (*Mr Wright.*) They are examined in London as well as at the dockyards?—They only examine the papers, I think.

1882. They are examined according to the scale of examination laid down by the Admiralty, and the Civil Service Commissioners carry it out?—Indeed. I would give them marks for practical efficiency that would make it a little more worth their while to work up in a practical way, before I took them into the navy.

1883. Are you aware that during the last two years, they have had a much more rigid examination, in practical work, than they had before, as they are now inspected by the steam reserve officers?—Yes.

1884. Could you offer any suggestion as to an improvement of the position of the engineer students while in the dockyards?—The only thing that would suggest itself to me would be to have something like a college for them.

1885. A place where they could reside and mess?—Yes, I think so.

1886. Do you think that would be practicable if the number were much reduced?—I think so. I do not see anything against such a thing myself.

1887. (*The Chairman.*) You think it would be desirable if it could be done?—Yes, I think, if you could keep them from running about the town, it would be an advantage. I would, as I have already said, give them marks for their practical qualifications, as I think that would be an inducement to them; they would see that they had to rub up more with the practical work, I think; they might do one piece of work very well, but in a general way they may not be able to do much. What you want is a good practical system of engineering with general knowledge.

1888. In the "Minotaur" do all the engineers, with the exception of the chief, sleep in hammocks?—Yes.

1889. Do you think it would be practicable to give them a cabin with three berths in it, and, if practicable, would it in your opinion be desirable?—It would be a great boon; if they were reduced in numbers, as you contemplate, why should not you do away with the engineer's berth, and make it a sleeping place. If only the three seniors could get it, or those that could mess in the ward-room on account of length of service, it would be a great boon. Just fancy a man, 44 years of age, sleeping in a hammock!

1890. At what age do you consider that a man should be promoted to the rank of chief engineer?—Unless under special circumstances, I do not think that he ought to be promoted at much over 40, unless he has just come within a year or so.

1891. What is the age at which you would like to see them promoted?—I should like to see them promoted at 30, or certainly 33. I think it would be a great benefit to the service if they were promoted earlier.

1892. Would you like to see them promoted by seniority, selection, or partly each?—I would rather

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see partly each. I should not like to see selection go too far, because I think it would be open to great abuse, and I know it is. This is the way I can express it: if two men are equal in talent and abilities, I say that the senior ought to be promoted first, unless the other shall have performed some special service.

1893. Do you approve of the education which the young engineers receive now at the dockyard schools?—As I said before, I think we ought to look more after the practical part; that is why I say I would encourage them in it by giving them marks; they get marks for the educational part, and they should, in my opinion, have marks for the practical part because so much depends upon that.

1894. Have you any suggestion to offer as to the position of a chief inspector of machinery, as compared with that of an inspector of machinery? would you like to combine the two ranks, or to give them a progressive scale of pay?—I think I would keep them separate. The title of inspector of machinery is not a nice title at all; the people in the country seem to imagine that it smacks so much of a policeman or the inspector of a cattle market.

1895. (*Captain Commerell.*) What title would you suggest?—I was thinking just now of a book, which no doubt you have seen, it is "The case of the naval engineers," and was drawn up some few years ago. I think they mention in that something about deputy inspector-general of marine engineering or inspector-general.

1896. (*The Chairman.*) Should not you think that was sufficient for the title of one man and not for the whole body of men?—It should be something like the inspector-general of hospitals. I suppose amongst themselves they seldom call him more than inspector-general. I know that the inspector-general goes up to 50s. a-day, and the deputy inspector-general goes up to 38s. a-day. (*The witness here examined the list showing the parentage of the engineer students.*) This list does not look promising at all.

1897. Looking at that list of the parentage of the engineers who have entered during the last three years, do you think it is satisfactory?—Decidedly not; and that is why I would recommend nomination in order to get over the difficulty; that is the only way in which we shall get over it, and I know it must take time before we can get a better class; it can only be done by being careful in the first entry.

1898. (*Captain Dowell.*) Do you think that there will be any difficulty in getting the sons of gentlemen to enter?—Not if you make it worth their while, and put them on the footing of the other officers as regards mess and position. I think it would bring in such an amount of talent that it would be very beneficial to the country. Taking the engineers as a body in the service, I think we are second to none. I saw a passed assistant-engineer in the American navy at Lisbon, in the "Juanita," a corvette. Her ward-room officers were invited to dine on board the "Agincourt," and of course the passed assistant-engineer came; he had the same dress as the passed assistant-surgeon and the passed assistant-paymaster, and they all had the same pay. That is a beautiful piece of simplicity, I think.

1899. With regard to the engine-room artificers, how would you propose to train them?—I think that the dockyard is a very good school for that. Those termed trade boys, I think, would do well for engine-room artificers. Through being about a dockyard they get a certain amount of naval knowledge, which I consider desirable.

1900. Do you think that would be preferable to having equally good workman obtained from the outside?—You would have, I think, better means of ascertaining if they had properly learnt their trade.

1901. You say that you think the number of engineers might be advantageously reduced; have you at all considered, in the event of war, how we should supply the increased number that we should require?—Then I think we should invite them from

the outside, but not the same sort as we did during the Crimean war.

1902. We all know that during the Crimean war the last men that we took were merely locomotive engineers, and we took them principally because they were men who were acquainted with high-pressure engines, which were then for the first time introduced into the service?—Yes, and we had to give them more pay than the engineers they were serving under. The men brought in got £16 a-month against our £12. If we opened it up to young gentlemen from the large factories now, during peace time, the same class would be available in the event of a war, and it would be preparing well for war.

1903. Do you know anything about the engineers in the merchant service?—I do not.

1904. You cannot tell at all how they compare as to social position with ours?—No, I could not venture an opinion.

1905. You do not know anything about their pay, I presume?—The pay in some of the large companies is very good, but I could not give it you in detail at all. With regard to our engineers, I may say that the term "pensioned" is objectionable to them, they want to be "retired."

1906. You have mentioned several of their grievances, especially with regard to the pay and slowness of promotion. Is there any other special complaint which they have?—They wish to have the engine-room mess abolished, and after so many years' service to mess in the ward-room, and below that in the gun-room.

1907. Are you of opinion that with the present class of officers we have, it would be desirable that they should be introduced into the gun and ward-room messes?—There are exceptions, and probably some would not care to go into those messes with the present rate of pay.

1908. (*Captain Commerell.*) Do you think that in a day would make a great difference?—That would be answered by saying that I think after eighteen years' service they ought to go up to 14s. a day.

1909. (*Captain Dowell.*) With regard to the engine-room artificers and stokers in the "Agincourt," by whom were they inspected?—By the engineers.

1910. Entirely?—Yes, I think I am right in saying that.

1911. Where did the engine-room artificers fall in at muster?—I do not know.

1912. Can you tell me where they messed in the "Agincourt"?—In the "Agincourt" they messed with the chief petty officers.

1913. Did that answer?—Not very well, I think; however I never heard any complaints about it in the "Agincourt." I certainly think now, in the "Minotaur," that they want a little rail to keep them separate from others. Their table consists of a board, about 15 inches wide, which puts up like a flap, and they sit in front of it, four of them, and they are not railed off at all. When they want to wash or bathe, they have to go to the same place as the stokers, and it is not distinct at all. They have I believe put up a curtain now, but it is anything but comfortable. The engine-room artificers want little comforts, such as a small place to mess by themselves, and a servant to attend to them, and to be allowed the option of paying for their hammockmen. They are a different class of men from the chief petty officers; they come into the service at about 24 years of age, knowing nothing about the routine of a ship, and it is putting them in a strange position entirely. If you want to increase the number of engine-room artificers, you must provide for those things. If you could put them at the top of the list of chief petty officers, I was thinking that it might protect them a little more.

1914. (*Captain Commerell.*) When you do that you must put somebody else at the bottom?—True; I do not care so much about the position, if you can give them a little comfort if they were put under the chief engineer, and given little comforts, and not inter-

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red with so much, I do not think you need care much about the rating they have.

1915. You stated that you would like to see marks given to the engineer students for their practical knowledge; have you found that the present junior engineers are deficient in their practical knowledge?—Oh, yes; but I have not had much to do with them since I have been inspector; when I was a chief engineer I had. They are very often put to keep the books.

1916. (*Mr. Wright.*) Do you think that is on account of want of ability or want of willingness?—A great deal may be due to want of willingness; many of them will not learn, I do not quite understand why.

1917. (*Captain Commerell.*) Do you consider that the six years which the engineer students pass in the dockyard is altogether satisfactory in fitting them to become engineer officers?—I think as a rule that six years is ample time.

1918. You consider that the six years which they pass in the dockyard, with the general work which they have to do, and the general arrangements which are made for them from the age of 15 up to the age of 21, fit them to become engineer officers?—I think it ought to be sufficient for making engineers of them.

1919. It may make very good practical engineers of them, but does it fit them for holding the position of officers?—Oh, no; certainly not. I should like to give them a mess place, or have a sort of little college for them.

1920. (*Mr. Wright.*) I think you said that all ships that indicated about 700 horse-power should have a chief engineer?—Yes.

1921. In that case would the chief engineer object to take a watch, as there would only be two engineer officers in those vessels?—If you bring in engine-room artificers would not those engine-room artificers keep a watch?

1922. That might be so, but how would it be sup-

posing the engineer was sick?—I do not think that that would be a difficulty. I do not think that the chief engineer would mind keeping a watch.

1923. Are any of the engine-room artificers in the channel squadron entrusted with charge of a watch in the stokehold?—Yes.

1924. And are any entrusted with a watch in the engine-room?—I do not know of any, and I should say not.

1925. They have no opportunities then of learning to keep a watch in the engine-room?—Not in the channel fleet.

1926. Have you any thing to do with the passing of them for confirmation?—Yes.

1927. Do not you know that it is part of the regulations that they should be able to keep a watch in the engine-room before being confirmed?—Yes.

1928. Then how can you tell whether they are able to do it if they have no opportunities of doing it?—They bring a certificate, or else they would not be passed; but I do not believe that any of them have kept a watch in the engine-room. I think that part might be left out.

1929. Engine-room artificers in small ships must take a watch, and it is in large vessels that they are to get their training?—That is one thing which escaped my memory. To train them for sea-going ships I think it would be well to put one or two additional in each of the ships of the channel fleet, and also in ships employed on channel service, so that when you send them to sea they would be ready to take a watch at once.

1930. (*The Chairman.*) You mean instead of keeping them in the reserve you would keep them in the ships of the channel fleet, so that they would be available for appointment?—Yes, I think that would be a very good thing indeed. I think you could accommodate one or two in each ship; but it would not do to put too many, so as to increase the complement too much.

(*The witness withdrew.*)

JOHN ALBERT WILKES, Engine-room Artificer, called and examined.

1931. (*The Chairman.*) Where are you serving now?—On board the "Arrow" gunboat, attached to the Royal Naval College at Greenwich.

1932. How long have you been in the service?—Seven years last June.

1933. You entered the service when the regulations for the shipping of engine-room artificers were first issued, I suppose?—Yes, on the 9th of June.

1934. What ships have you served in?—The "Crocodile," the "Arrow," and in the "Asia" reserve ship at Portsmouth for a few days.

1935. How long were you in the "Crocodile"?—For five years within a few days.

1936. Where did you mess in the "Crocodile"?—For the first four years we messed on the lower troop deck, next to the cells.

1937. With whom?—The three artificers; we had a stoker who was handy, so he messed with us.

1938. Did he clean your mess?—Yes, he was told off for that duty.

1939. Where did you mess afterwards?—We had a mess put under the mess deck in amidships; an amidship table, with a stool on each side.

1940. Were you still by yourselves?—Yes.

1941. Was that stoker excused for you entirely?—Yes.

1942. Was he a second-class stoker?—A second-class stoker part of the time; one of the first-class stokers met with an accident, so that man remained with us until we paid off, although promoted.

1943. Where did the other chief petty officers mess?—Under the mess-deck, at the first mess table

forward. The master-at-arms had a sort of cabin in the middle of the mess-deck. J. A. Wilkes.

1944. Half screened off?—Boarded right up to the deck. 20 Oct., 1875.

1945. Did you keep a watch in the "Crocodile"?—I did, for the first commission; the latter part of the second commission I was on day duty.

1946. When you kept watch, what duty did you do?—For the first three months I kept stokehold watch, under the assistant-engineer; for the remainder of the time I had charge of the stokehold.

1947. Have you ever kept watch in the engine-room of any ship?—Only in the "Arrow," coming round from Portsmouth.

1948. Did you work the engines in the "Arrow"?—Yes.

1949. Have you a certificate showing that you are capable of doing that?—Yes.

1950. From whom did you get it?—From Captain Watson at my confirmation (*the witness handed the certificate to the Chairman*).

1951. Were you examined in order to ascertain your capability?—Yes.

1952. When you got that certificate, had you had any experience at all in working engines, starting and stopping them, and so on?—Only in assisting the engineer in charge of the stokehold; and at that time, when I kept watch, I went down in the engine-room and assisted the engineer.

1953. Are you now capable of taking charge of the engines of the "Arrow" at sea, under all circumstances?—Yes,

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J. A. Wilkes. 1954. Who had you in the engine-room of the "Arrow" besides yourself?—Mr. Canter, the engineer in charge, a leading stoker, and two stokers.

20 Oct., 1875. 1955. Have you ever been under way without Mr. Canter?—Yes, once; Mr. Canter was left at Woolwich, and I brought the ship down.

1956. On one of the expeditions down the river with the officers?—Yes, I had charge of the watch coming round from Portsmouth in the "Arrow."

1957. What age were you when you entered the service?—About 24½ years.

1958. Where did you come from?—From Portsmouth.

1959. From the factory?—Yes.

1960. How long had you been there?—From July 1859 to 1868, nine years.

1961. What did you enter as?—As a boy. I had a bond as a rivet boy in the boilermakers' shop.

1962. Then you are a boilermaker by trade?—Yes.

1963. Did you do any other work besides boiler-making work in the "Crocodile"?—Yes, I worked at the lathe.

1964. As a fitter?—Yes.

1965. Where did you learn that?—In the boiler shop at Portsmouth; we had a lathe there and we did our own work.

1966. Have you been employed in your work as a fitter since you have been at sea?—Slightly I have.

1967. What work do you chiefly do in the "Arrow"?—Making things that are required for Mr. Tuck, models. I put up the "Bee's" engines, and have the erecting of an engine in the mathematical department at Greenwich at the present time.

1968. Under whose superintendence are you erecting that engine?—Under the superintendence of Mr. Canter.

1969. What was your pay in the factory when you left there?—5s. a-day.

1970. Why did you prefer 5s. per day at sea to 5s. a-day on shore?—On account of slackness of trade.

1971. But if you were in the factory, how did that affect you?—For about eight or nine weeks there were continual reductions in the factory, and I was the only youngster who had served his time in the factory out of the lot, and there were thirty to come out the next week, and I did not know whether I had got to come out.

1972. Are you a married man?—Yes.

1973. Were you then a married man?—Yes.

1974. Have you any family?—Yes, three children; I had one before I joined the service, but it is now dead.

1975. Do you find the service at sea what you expected it to be?—No, I could not know what a chief petty officer was, and I was rather surprised to find out when I got into the service.

1976. (Captain Dowell.) You were disappointed?—Yes.

1977. (The Chairman.) Do you think that a young man, coming from a fitters' shop, and who had just completed his time there, ought to be placed in a higher position than a chief petty officer on board a ship of war?—I think it would be better not to have any position at all, if it could be so arranged, not to be rated at all as chief petty officers.

1978. You do not care about the rank and position, in fact; but what you want is to be made more comfortable?—Yes.

1979. What would you suggest yourself. I dare say you have visited other artificers in other ironclad ships?—Yes I have.

1980. What would you suggest as a convenient place for you to mess in, looking to what is practicable?—As close to the engine-room as possible.

1981. Did the master-at-arms have anything to do with you on board the "Crocodile"?—When going on shore, perhaps, when you get leave from the chief engineer, you could not go because the master-at-arms would say there was not leave giving in the ship; and at other times you were detained on board when leave was given in the ship, on account of your duties.

1982. What shall you do when you have completed your ten years' service?—If I can find a better market for my labour I shall take it there.

1983. What do you expect to earn on shore at the end of your ten years' service?—I should think about 38s. a week as a boilermaker.

1984. (Captain Dowell.) What do you get now?—5s. 9d. a-day.

1985. Then you get about 40s. a-week now?—I get £2 0s. 3d.; but then if you are working on shore you have the comfort of a home, and you do not have to work on Sundays.

1986. (The Chairman.) Do you have hard work on board ship on Sundays?—Yes.

1987. In harbour?—No, not in harbour.

1988. (Captain Commerell.) Were you kept in the "Crocodile" in the summer?—Yes; we had plenty of work to do.

1989. (The Chairman.) You did not work on Sunday at Portsmouth, did you?—We had to keep regular watch, and take our turns.

1990. But not to do any work?—No.

1991. Where does your family live?—At Greenwich.

1992. Looking at the service as it is, would you rather remain in the service for an increase of pay, after the end of ten years, or go ashore?—I would rather remain in the service.

1993. So far as the service is concerned, you do not object to it, but you think that your position ought to be improved?—Yes.

1994. Do you think that is the case with a great many artificers?—I believe it is.

1995. After what length of service do you get pension?—After 20 years' service.

1996. Then you will be what age?—44 years of age.

1997. Do you know of many engine-room artificers who have purchased their discharge?—No, I do not; but I believe a few have purchased their discharge, and several have been put out of the service since engine-room artificers were first established. I do not know any one personally.

1998. Is the other artificer at Greenwich a fitter?—He is a smith.

1999. Was he a stoker in the service?—Yes. One artificer I remember who purchased his discharge, Kilpatrick was his name.

2000. After how long a service?—Five years.

2001. Did his friends buy him out?—Yes; his friends purchased him out.

2002. If we wanted to increase the number of engine-room artificers in the service, where do you think we should have the best chance of obtaining them?—I think from the government yards, by offering them a little more money to start with; wages have gone up, and they will not leave 5s. 6d. a-day for 5s. a-day.

2003. You see it is 5s. 6d. for six days and 5s. for seven days?—They do not think of that.

2004. (Captain Commerell.) There are pension rations, seven days pay instead of six, and permanent employment?—But the men do not think of the seventh day.

2005. (The Chairman.) But it is unreasonable that they should not?—They think of so much a-day, they do not think about the seventh day, or of the rations. I have been on overtime for six months, right off, up to half a day every day.

2006. In the factory?—Yes.

2007. Would you consider yourself as good a workman now, to go back to your trade in the factory, as you were when you left?—I believe so. As regards hard work, I might have a week and then have to leave off for a few days; about a fortnight after I had been out of the service I should be as good a workman as ever I was.

2008. Have you worked with the young engineer officers in the floating factory in the reserve?—Yes. I was only a few days there on board the "Volcano" at Portsmouth.

2009. Which do you consider to be the better workmen, the engine-room artificers or the engineer students?—As regards workmanship, I believe the artificers are the best workmen.

2010. You feel sure about that, you do not question it?—I do not question it.

2011. Did the artificers in the "Volcano" work the same hours as the engineers?—The artificers started one hour earlier in the morning and worked half an hour later in the afternoon.

2012. Do you think there are many men in the factory now who would be willing to enter as artificers, if we wanted them?—I believe there are, and in the private trade too.

2013. Do you suppose that at the ironworks in the north, the workmen know the advantages which an engine-room artificer afloat has?—Yes, by the trade society.

2014. Do you belong to a trade union?—I did, but two years after I joined the service I left it.

2015. You did before you joined the service and you continued in it two years afterwards?—Yes.

2016. Why did you leave it?—The contributions were too much; they made no reduction for people in the service, but for people running in private ships they reduced the contribution one-half.

2017. They have not done that for those in the service?—No.

2018. I suppose the object of contributing to the trade society, is to get payment in case of sickness?—Yes.

2019. Are you paid when out of work?—Yes.

2020. Have you any pension in old age?—Yes.

2021. You have got that in the navy?—Yes.

2022. So far as pecuniary benefit is concerned, the navy provides you with all the advantages conferred by a trade society, without any contribution; is not that so?—Yes; the disadvantage of the navy is that you are away from home.

2023. What are your expenses on board ship?—We pay a man for scrubbing our hammock.

2024. What do you pay him?—4s. a-month. The hammocks were scrubbed every fortnight; then there is washing clothes, and extra for rations on board ship.

2025. How much will that cost you?—About 5s. a-week each in the mess.

2026. £1 a-month?—Yes; 4s. a-month for hammocks and washing clothes; any very dirty clothes, such as are used in the engine-room, are washed in the ship.

2027. Did any of the engine-room artificers scrub their own hammocks and take them out and down?—No; they never did it themselves.

2028. If not scrubbed properly, was it found fault with?—It was found fault with.

2029. Are you satisfied with the dress you wear?—I should like a frock coat. All the other parts of the uniform I am satisfied with, but I do not like the jacket.

2030. (Captain Commerell.) A frock-coat would only be an additional expense to you?—I do not mind that; when going ashore out of the engine-room, the jacket is a very cold dress, you feel the cold round the loins. I have found it to be so, although a short jacket is a very nice dress on board ship.

2031. (The Chairman.) What pay now would you suggest that an engine-room artificer should receive after he had been ten years in the service?—7s. 6d. a-day; he should commence with 5s. 6d. It would not do to commence with less, because you would get inferior men if you did.

2032. To commence at 5s. 6d. a-day and go up to 7s. 6d. a-day at the end of 10 years?—Yes.

2033. And you think that good pay and good treatment on board ship is what the engine-room artificers would value more than rank and position?—Yes; of course, there are little things on board ship that everybody must submit to, but I refer to comforts as regards mess, and non-interference by the master-at-arms. The engine-room artificers are officers that

ought not to be interfered with by the master-at-arms. J. A. Wilkes.

2034. You think that grates against them more than anything?—Yes. 20 Oct., 1875.

2035. Why is that?—I do not know why it is.

2036. Is it that they do not know what your duties are in the engine-room?—Yes, I think so.

2037. They do not know that you are worked at different times and hours to the others?—Yes, that is it.

2038. There is nothing in the name of master-at-arms to make the man specially obnoxious, is there?

—No. If we could get leave from the chief engineer, subject, of course, to the commanding officer, without any thing to do with the master-at-arms, it would be better.

2039. You would like to be more under the direction of the chief engineer?—Yes.

2040. As a boilermaker was it your duty in the "Crocodile" to constantly examine the interior of the boilers?—Yes.

2041. That was supposed to be your special duty?—Yes, to examine the boilers, and to do all the repairs that were necessary.

2042. Such as replacing tubes?—Yes, and hatchways if required.

2043. During the summer months, when the ship is under repair, had you plenty of work to do on board in your own particular department as boilermaker?—Only once we had. The dockyard men would be aboard doing repairs to the boilers, but then we had the engines.

2044. Did you clean the engines?—The stokers do that entirely.

2045. You only use your tools?—Yes.

2046. Your duty in the engine-room is confined to that?—Yes.

2047. Do you find any tools for yourself?—Yes, a few.

2048. Are you obliged to?—We generally make them in the ship, and when we leave the ship we generally leave them; the tools which are supplied are not always suitable for the work to be done.

2049. Do you think that the pension is any inducement for the men to join the service?—Yes, when I came into the service I thought more for the first 12 months that it would be taking a permanent job for a time, and I would then get out of it; then I got the uniform, and I thought it would be a pity to leave that to spoil, so I went on.

2050. You were booked for 10 years?—I was on probation for one year.

2051. It appears to me that the advantages which are offered to engine-room artificers to serve afloat, are the following: Permanent employment?—Yes.

2052. A pension at the end of 20 years?—Yes.

2053. Pay for seven days in the week instead of six, rations found, and pay during sickness?—Yes.

2054. Medical attendance?—Yes.

2055. And leave to go to their friends on shore without forfeiting pay?—Yes.

2056. And a little higher pay than they receive on shore?—Yes.

2057. Those advantages have to be weighed against the disadvantages of having to leave their homes and go to sea, is not that it?—Yes. The leave to go on shore to see their friends comes sometimes very slight. I have known some men who have been away from home almost five years; in that case the chance of seeing your friends is very slight indeed. Now, I have a brother in the Peninsular and Oriental Company; he was abroad for three years as a boiler maker, and was getting £13 a month; he had a respectable uniform, a cabin, and a servant to attend to him.

2058. Was he called an engineer?—A boilermaker; after three years he served on a home station, running from Portsmouth to Alexandria; he had to pass the Board of Trade for second engineer, and then he went out to Calcutta again and got £25 a-month.

2059. That was when he was in India as a second

J. A. Wilkes. engineer?—As a boilermaker; but he had a Board of Trade Certificate as second engineer. I was running on almost the same part as he was running. I was in the service getting 5s. a-day, and he was getting £13 a-month, and he was doing exactly similar work to me.

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2060. Is he younger or older than you?—Five years older.

2061. Had he served the same time as a boilermaker as you had?—Yes, at the same place.

2062. What did he receive when he came home?—He was kept on full pay at Southampton for nine weeks.

2063. Why did not you join the Peninsular and Oriental Company's service?—He persuaded me not to join the service at all, but when this came out I joined the government service.

2064. Did he do duty in the engine-room?—In the stokehold watch.

2065. What ship was he in?—The "Mooltan."

2066. How many engineers were there?—Five engineers, a chief and a boilermaker.

2067. As a rule those ships do not do their repairs afloat; their repairs are completed when they return to Southampton or at Calcutta?—Yes.

2068. (Captain Dowell.) Have you heard the engine-room artificers complain at all of the way in which they are mustered and inspected?—No; I have not heard any complaints about that. In the "Crocodile" we mustered the stokers at divisions and reported to the chief engineer; the senior engineer, was on duty.

2069. Have you ever been in a regular sea-going man-of-war?—No.

2070. (Captain Commerell.) What did you contribute to the trade union?—4s. a-month; that was when work was very slack; there was a lot of men out of work, and they raised the contribution to 4s. a-month.

2071. (The Chairman.) Is that irrespective of the amount of your pay?—All that get 5s. a-day, some get over; riveters get 5s. a-day, and an angle-iron smith gets higher pay still. I consider my branch to be that of a plater and angle-iron smith.

2072. That is all part of boilermaking, is it?—Yes.

2073. (Captain Commerell.) Do you think that we shall ever have any difficulty in getting engine-room artificers out of the dockyard?—At the present rate of wages, you will.

2074. But if the wages were increased slightly?—Then I think you might almost get as many as were required.

2075. (The Chairman.) For 5s. 6d. a-day to begin with?—If you give corresponding wages to what they get on shore there would be no difficulty then, with other circumstances considered at the same time, the mess, and so on. It is now known about the mess, and so on; and in a great many ships the engine-room artificers have to clean the mess out, which they are unfitted for, having been trained on shore as mechanics.

2076. (Captain Commerell.) Then you understand from the artificers generally that it is the custom for them to clean their mess?—I never did it myself; the last three years I was on duty I was required to be about the ship; that was in the "Crocodile."

2077. (The Chairman.) Who did it for you?—A stoker.

2078. (Captain Commerell.) In the other Indian troop ships, were second-class stokers employed?—In the "Jumna" the engine-room artificers had to clean their own mess.

2079. How did they do in the "Euphrates"?—I believe there they messed with the other chief petty officers, and had to take turns.

2080. In the "Serapis"?—They did not clean their own mess there.

2081. I suppose you have been in the habit of talking over all these things amongst yourselves?—Yes.

2082. (Captain Dowell.) When at Malta did you ever talk with the engine-room artificers of the Mediterranean squadron?—Yes.

2083. What was the general rule there about the messing?—In some ships they cleaned out their mess themselves, and in other ships they had some one told off for that purpose.

2084. Were they as a rule contented?—They were not. The wish is to have a separate mess, away from the ship's company, if possible.

2085. (The Chairman.) In the neighbourhood of the engine-room?—Yes.

2086. Is there any other point in which you would like to see an alteration?—Oh, yes; the chest.

2087. What size do you consider that the chest should be?—I have had four different sizes since I have been in the service.

2088. Have you had four chests?—Yes.

2089. All at the same time?—The first chest I had to have made for the "Asia;" it was 1 foot 2 inches wide, 18 inches high and 3 feet long; that was very small indeed.

2090. (Mr. Wright.) Were those the outside dimensions?—Yes. Then I took it on board the "Crocodile," and it was not big enough. I believe then that the next chest was 18 inches square, 3 feet by 18 inches by 18 inches; then when the circular came out, 3 feet 4 inches by 2 feet by 2 feet, I got that size in preference to the other one.

2091. (The Chairman.) That is more than double the size?—That is a very nice chest.

2092. Is it in accordance with the circular?—I think so; any one who had that chest could reach it. Since that time the size has been altered to 3 feet 4 inches by 20 inches, which is too small, as we require more clothes than any other branch of the service. I have had to change my suit five different times, as it has not been fit to put on again; that was only once though, in the "Crocodile."

2093. What you wish to say is, that the chest which is now allowed by the regulations is not large enough?—Yes, I should like to retain the 3 feet 4 inches by 2 feet by 2 feet chest.

2094. (Mr. Wright.) If you were to make up your mind to remain 20 years in the service, would you like to have a spell of work in the dockyard for a time?—Yes, I should like to have it if I retained my pay and my time was going on. I do not wish to draw any comparison with other classes in the service; but there are three classes that have that size of chest, and I believe that the engine-room artificers were not represented, and that if they had been they might have retained that 3 feet 4 inches by 2 feet by 2 feet chest. It is just the same size chest as that of the master-at-arms.

2095. How were you taught your duties in watch-keeping when you first went on board ship?—In two ships I kept watch under the assistant engineer in the stokehold.

2096. And he explained to you all that you had to do?—Yes.

2097. When you were in the engine-room, I suppose, some of the engineers explained in the same way what you had to do?—I found out what I had to do by looking on.

2098. (The Chairman.) Have you any bag or locker for your clothes besides that chest?—No.

2099. Would it not be convenient to you, if your chest were not made larger than it is now, to have a locker in which to put your dirty clothes?—I would rather have a chest. When moving about that chest of 3 feet 4 inches by 2 feet by 2 feet is none too big, although it is a job to carry it.

(The witness withdrew.)

[Adjourned to to-morrow at 12 o'clock.]

THURSDAY, 21ST OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.
CAPTAIN WM. M. DOWELL, R.N., C.B.
CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., J.C.
JAMES WRIGHT, Esq.

G. FINLAISON, Esq., Secretary.

CHARLES ICELY, Esq., R.N., called and examined.

2100. (*The Chairman.*) What position do you hold at present?—I am an inspector of machinery afloat.

2101. On half-pay?—Yes.

2102. Where did you serve last?—In the "Devastation," for a short period. I was promoted from her.

2103. How long were you in the "Hotspur"?—Three years.

2104. How long were you in the "Devastation"?—Only a month.

2105. What horse-power is the "Hotspur"?—600 horses nominal.

2106. What ship were you in before that?—In the "Donegal" before that, and before that in the "Caledonia."

2107. What staff of engineers had you in the "Hotspur"?—Six engineers and three engine-room artificers.

2108. What staff had you in the "Devastation"?—As far as I remember 10 engineers, one chief and six engine-room artificers. I had not charge of the engines during the time I was there. I was sent there by an arrangement of the Admiralty to gain experience, as she was a peculiar ship, before taking charge, and in the meantime I was promoted.

2109. Was there another chief engineer?—Yes, present there during the whole time I was there, and he had not left at the time that I was promoted.

2110. Was he senior or junior to you?—Senior to me; he had retired or had made application to be retired, and I was appointed in his stead.

2111. Do you think it is desirable in any case to have two chief engineers in a large ship?—I do not think so.

2112. How long were you a chief engineer?—17 years, from 1857 to 1874.

2113. About what age were you when you were made a chief engineer?—29.

2114. How is that you were promoted so young as compared with others?—I think I was promoted in the ordinary way at that time. It was just after the Crimean war, when promotion was comparatively rapid.

2115. From where did you join the service?—I was brought up in the service as an engineer boy.

2116. In the factory?—Part of my time in the factory, and part afloat. Part of my time also in Malta dockyard.

2117. When did you join the service as assistant-engineer?—In 1847, I was sent as a supernumerary to Malta and appointed to the "Ceylon" as supernumerary for disposal.

2118. By the regulations could you have retired as a chief engineer before you got your promotion?—No, I had not attained the specified age.

2119. If you had been enabled to retire as regards your length of service, would all your junior time have counted?—No, I should have lost nearly five years: four years and ten months.

2120. Why was that?—From the fact of my being a third engineer during that period, which time by the recent regulations for retirement is not allowed to count.

2121. Under any circumstances?—Under any circumstances.

2122. That is the same as it is now with the second class?—Precisely.

2123. All the other junior time would have counted?—Yes, all the other junior time would have counted.

2124. What period of half-pay had you while a chief engineer?—I do not think I had quite twelve months.

2125. In the early part?—Yes, the early part. On promotion I had six months on half-pay, and then, after being superseded in the "Hotspur," I was a few months on half-pay before being appointed to the "Devastation."

2126. What rate of half-pay?—14s. a day the second time, and the first time 5s. a day.

2127. The half-pay is now increased 1s.?—Yes.

2128. Do you think that the present state of promotion from the list of engineers is satisfactory?—No; it is very unsatisfactory, I think.

2129. What would you suggest to improve it?—I think it would be a good plan if they were allowed to retire optionally at 40 years of age.

2130. That is the engineers?—Yes, that would cause a flow of promotion. It should also be conditionally, that is to say, that it was considered by them as a retaining fee to form a nucleus for a reserve in case of war.

2131. Are you aware to how many that would give the option of retiring at the age of 40?—I am not. I have not given it any attention. I can only speak on the intimation I received from your secretary, which referred to the supply of engineers. I did not know of the other bases of your inquiry before I came here; but it occurred to me to-day that that would be a good scheme for forming a reserve.

2132. Do you mean that you would limit that optional retirement to the age of 40, or do you think it would be desirable to lower the age?—I think that would meet the requirements, if there were an additional inducement. I mean, for instance, if they were at that age allowed to retire on the maximum, I do not think that they would be induced to go unless they had some addition to what they would get under ordinary circumstances under the present regulations.

2133. Then you might put it in this way, that you would, to expedite promotion, like to see inducements given to the engineers to retire?—I would, in order to cause a flow of promotion.

2134. Would you fill up their numbers with others, or would you propose to reduce the list of engineers permanently?—I would permanently reduce it.

2135. Do you think that we could afford to have fewer engineers in ships, and more engine-room artificers?—I think so, with advantage to the service.

2136. Can you give an idea from your experience in the "Hotspur" as to what you would think to be a satisfactory complement for that ship in accordance with your desire to reduce the whole list of engineers?—We had during the time that I belonged to her six engineers, and I think it might be safely reduced by two, with an increase of three engine-room artificers. For instance, originally there were six engineers and three engine-room artificers, and I think with four engineers and six engine-room artificers you would do very well, and the engine-room would be properly officered.

2137. Do you think that the engine-room artificers are equal or superior as workmen to the young engineers now joining the service?—I am not prepared to say. My experience with regard to the young engi-

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neers is confined within a very small limit, I mean my sea-going experience. Within the last two or three years recent entries have come under my observation in the steam reserve, and from what I have seen I have no reason to complain of them, and I should think that they would be fully equal to the engine-room artificers. From what I have observed of those who served with me some nine or ten years since, I have reason to speak very highly, that is of the majority of them.

2138. In general, have you found the engine-room artificers well qualified for their position?—There have been exceptions, but generally they have been well qualified as mechanics.

2139. Which you do find to be the more useful artificer in a shop, a boilermaker, a coppersmith, or a fitter?—A fitter most certainly, and the boilermaker next. They know the engine almost from its birth, as it were, and the boilermaker is employed in making boilers and so forth, and has opportunities of seeing machinery, therefore, those two men must necessarily know more than a coppersmith or a blacksmith.

2140. Can a fitter ever do coppersmith's work?—That quite depends on the place of employment in which he was trained.

2141. Have you seen it?—I have not.

2142. Do you find that the boilermaker after a time can help at the lathe and in the fitter's work?—I can speak of two cases where they made themselves generally useful and showed a special aptitude for any branch.

2143. Have you seen an engine-room artificer keep watch in the stokehold in charge of the boilers?—No, that is not within my experience.

2144. Do you think that an engine-room artificer, after a year at sea, supposing him to be an intelligent man, would be able to keep watch in the engine-room of a small vessel?—I do not think it would be expedient that he should.

2145. It is done every day?—I quite admit the possibility, but I doubt the expediency of it.

2146. Is it not the case in all vessels where they have only two engineers, that the engine-room artificers must keep watch in the engine-room?—Yes, and by the same rule, where the exigencies of the service require it, a chief petty officer, or a boatswain, or a junior officer, may keep watch, but they will be directly under the supervision of the captain, in the same way the chief engineer would keep an eye on the engine-room artificer.

2147. The chief engineer would be responsible for everything going on in the engine-room. You will understand what I mean when I say that the engine-room artificer keeps watch in the engine-room; he always keeps watch under the supervision of the chief engineer?—I gathered that it was expressly as an engine-room watch that you meant.

2148. (*Captain Dowell.*) Would he be as competent after a short time at sea to keep a watch as an assistant engineer on first going to sea?—It is a question of responsibility, and he is a man that has not so much to lose as an engineer; besides, it is expedient that complicated and valuable machinery should be put into his charge when he has comparatively nothing to lose?

2149. (*The Chairman.*) Do you think that the pay the engine-room artificers receive now is satisfactory and sufficient to enable us to get good men?—I think up to a certain point it is, but after ten years' service I would recommend an increase if we wished to retain them.

2150. Do you think, from your knowledge of the pay that similar men in the factories in the private trade receive, that 5s. per day, the rate which they receive on entry into the service, will enable us to get good men?—I think so on first entry, but I would make that pay progressive.

2151. Going up to what?—Up to 7s. per day after 10 years' service. I think that would be a sufficient inducement for them to remain in the service. With regard to the formation of a reserve, I would extend

that to the engine-room artificers. I think that after a certain term of service, under the same conditions as I mentioned just now, they might be retained.

2152. You mean that you would give them a pension before they had completed their 20 years' service?—Yes. I mean that it should be optional, and conditional also, that they had this additional pension, or a pension equivalent to a term of service that they had not completed, should be given them on retirement to induce them to allow themselves to be called upon in case of need. It should be a sort of retaining fee.

2153. Do not you think that the same object might be gained without giving them a pension. If after a certain period of service, they were employed in the dockyards and factories, with the understanding that after they had had three years in the dockyard they were liable to be called out to go to sea again?—I think that would be a very good plan. You might extend the system in forming a reserve, too. I think, by giving directions to the chief engineers or captains of ships, that the stoker-mechanics should be employed to assist in the care and management of the machinery.

2154. Ashore or afloat?—Afloat, when the engines are at work at sea. By that means they would be gaining experience, and it would introduce an element that would admit of large expansion in case of need, that is, in the event of war, they might take the artificers' places.

2155. Do you think it is likely we shall get better engine-room artificers from the private trade than our own factories?—I think it would give a more healthy tone if outside talent were introduced. It would enable us to travel out of the groove that we are getting into. I think that a portion of them might be very well trained in our government factories.

2156. But you would supplement that portion by taking others from the outside?—Yes.

2157. From your experience of engine-room artificers, do you think that we get better men from the outside or our own factories?—I think from the outside they would have a larger experience in general work.

2158. Have you heard any complaints from the artificers as to their usage on board ship?—I have.

2159. Will you inform the Committee what sort of complaints they are?—I made some notes about that. They seem to complain that they are not accepted in the right spirit, as it were, with regard to their social position; that the chief petty officers with whom they rank get more privileges than they do, or are better recognised, or something of that kind. I have made a note of that, and will, with your permission, read it to you. In their mess arrangements they complain that they have to perform menial duties, such as scrubbing out the mess and what not, which is detrimental to the arrangements of the engine-room: very frequently they are employed in scrubbing out the mess when they might be more usefully employed in their own special vocation. There is another complaint which I heard yesterday, and that is, that they do not have chests of the same dimensions as their brother officer, the master-at-arms, in the ship. I believe they have relative rank and position with him, but their chest is not so large. I am not prepared to say that that is the case, as I have not measured it. I also think there is some circular in regard to a mess attendant or boy, or something of the kind, for engine-room artificers, which they do not always get.

2160. (*Captain Commerell.*)—That is for the chief petty officers' mess?—Yes.

2161. (*The Chairman.*) The custom is to give them a boy or servant, and where they do not get that you mean that they complain of the want?—Yes.

2162. (*Captain Dowell.*) It is customary to have a stoker in their mess?—Not from my experience.

2163. (*The Chairman.*) In the "Hotspur" they had no attendant in their mess, had they?—They had at the first part of the commission, but I think it was a boy, as far as my memory serves me. I am not

sure upon this point, but, for some reason or other, this boy was refused, or his services were required elsewhere. I do not think, as far as my recollection goes, he was ever replaced, and that was a source of grievance with the artificers.

2164. Have you heard them complain at all about their dress?—Yes; that they have not the same uniform as those of relative position; a single-breasted frock coat, I think they aspire to.

2165. Only some of the chief petty officers of their rank wear frock coats?—Quite so.

2166. Those are the points they complain of, are they?—Those are some of their grievances.

2167. (*Captain Commerell.*) They look at the petty officers who are a little better off than they are, but they do not look to the vast number of petty officers who are worse off?—Possibly that may be so.

2168. (*The Chairman.*) Are you satisfied, or do you think that the present education of the young engineers, or their position, is suitable for their training for the service?—I think, with some additions, and with the removal of some demoralising influences during their training, it is a very good school, and that the dockyard factories afford facilities for learning every branch of the trade.

2169. Both practically and theoretically?—Yes; and if the advantages offered were usefully utilized I think there is every chance of turning out the very best engineers.

2170. Are you aware of the present regulations for the entry of engineer students?—I am: by competitive examination.

2171. Do you know if any selection is made from them as candidates?—Only from their place on the list; anybody can present himself.

2172. Do you think that is a good system?—I do not.

2173. What would you suggest?—If you will permit me, I will read my views on the subject: "Standard of education to remain the same, but nomination of candidates to supersede the present system of open competition. While the entry of youths for training as officers in the other branches of the service exists by nomination, it is desirable it should extend to the engineer branch, as the majority of the successful candidates by the present open competitive system, are Greenwich school-boys, where it would appear they are specially trained to pass the examination, which leads to the exclusion of boys of higher social standing. This involves the taking of our future engineer officers from the same source as that from which the sailors and marines are supplied, and renders it not improbable that the engineer officer may have the mortification of finding himself serving in the same ship with his father or brother who holds the position of seaman or marine; and as a further reason, it is hardly fair to the other officers of the ship (who have entered the navy under different auspices) with whom the engineer will socially mix on his attainment of ward-room rank. To remedy this, it might be made a condition on the entry of future candidates that no emolument should be given them for the first three years of service."

2174. As students?—Yes, "which would doubtless go far to insure a class of boys presenting themselves of higher social pretensions, and remove much of the class prejudice which now exists." I mean that conditionally while it exists with other branches.

2175. (*Captain Dowell.*) Do you think there would be any difficulty in getting the sons of gentlemen to enter?—I do not think so, if the status were raised.

2176. (*The Chairman.*) If you wish to introduce men of a higher social class, as engineer students, is there any change which you would propose in their treatment, while in the dockyard?—If you will permit me, I will read to you my views on that subject.

2177. (*Captain Dowell.*) Have you ever served in the reserve?—Yes, for a short period before my promotion, some two years ago. This is what I

suggest:—"Course of practical education to be supervised by a naval engineer, appointed as an additional assistant to the chief engineer of the dockyard. This officer to report, through his superior, on the conduct and proficiency of the students, instead of the leading artificers doing so, as at present. A lavatory be appropriated for them, and sufficient time allowed them to wash their hands and change their working dress before leaving the yard at noon and evening (no time is allowed at present, as they are required to work up to the moment of 'bell-ring'), five to ten minutes would be sufficient for the purpose; separate water-closets from the ordinary mechanics and laborers of the yard, which they now use in common with them. The signing of a book be substituted for the present lodgment of tickets on entering and leaving the yard. Lectures on the steam-engine be given them once a-week, as a part of their educational training; no instruction in this respect is now given them," so far as I know.

2178. (*The Chairman.*) While in the dockyard?—Yes, while in the dockyard. "Skeleton models of the various types of marine steam engines, made by the advanced students, would serve to illustrate the lectures. The talents of two or more of the engineers waiting appointments in the Steam Reserve might be usefully utilized in giving instruction in the model-room, if they were lent to the factory for the purpose. The periodical steam examination papers to embrace progressively the subjects on which lectures have been given as a test of the interest taken by the respective students. The practical efficiency of the students to be made of equal importance with their theoretical attainments, and rewarded in a similar degree. On entry to the navy, to be appointed immediately to sea-going ships, and serve a probationary term of twelve months (without prejudice to their time counting for service) before taking charge of a watch." My reasons for these are: "To remove them from the demoralising influence on their position as officers, which is likely to arise from their being employed at the same bench in the floating factory as the engine-room artificers and stoker mechanics, and to give them the necessary experience before taking responsibility." Another point which I think is an important one is: "That marriage in their case should be a disqualification for entry to the navy, which would go far to prevent early and often injudicious marriages, which a long residence in one place sometimes induces, crippling them pecuniarily and otherwise." It does cripple them in every possible way, and I look upon that class of early marriage as a bane.

2179. Are you aware that the engineer students are examined in practical engineering every year?—I am.

2180. What do you mean by examination on the steam engine?—There are papers sent from the Admiralty, I think from the steam office; and lectures would be, I think, very effective in enabling them to answer the questions properly.

2181. But they have an examination at present, and are compelled to get up the information?—Indeed.

2182. (*Mr. Wright.*) The examination papers say: "Examination on the steam engine, steam boilers, and trade operations in the factory"?—But if they have no instruction in that respect to prepare them to answer those questions, it is very difficult for them to do so.

2183. (*The Chairman.*) Do you think that the regulations which have been laid down during the last two years for the practical instruction of the engineer students has caused any improvement in them?—It has certainly improved them, but I think it would be much more desirable that an officer should have charge of them, and should specially supervise them, instead of an artificer.

2184. Would not there be a difficulty in a naval engineer supervising them, who would have no authority in the dockyard?—He could, by being appointed under the chief engineer of the dockyard, have the necessary authority, and be made responsible

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to him for the efficiency of the students. I think that would cause emulation amongst the various yards as to which would turn out the better men.

2185. Did you ever have any share in the examination of the engineer students?—I have not, not on entry to the service; afloat I have, as chief engineer in the flagship, after they have been some time in the service.

2186. Do you think that, if the engineer students are admitted from a higher social class, that many of those recommendations for their treatment in the yards are necessary to enable us to obtain them?—I think so; the status really, practically speaking, is that of an ordinary mechanic or labourer, and it pains the susceptibilities of the high-spirited ones amongst them to a great degree.

2187. Is it not probable that the present system of regulations under which they act in the dockyard results from their coming from the same social class as the workmen in a great measure?—I can hardly answer that question; it quite depends upon the authorities as to how they are governed when there.

2188. I am only looking to what we might ordinarily expect; if they are the sons or brothers of the workmen in the yard, it is not likely that any attempt would be made to alter their condition?—I should think that the high standard of education required of them deserve better things. If not irrelevant, I would here mention a case in which I am personally concerned, where the present system of open competition bears somewhat hardly on the sons of old officers. I have a son who was a candidate for the engineer studentship, and he was fairly educated. I think from subsequent remarks that you will agree with me that he was. He went in for an open competition, and succeeded in taking a good place; he was twenty-fifth on the list, but some ten only were required; he satisfied the examiners, nevertheless. This happened in July or August, I forget which, but in the following December he went in for a local Cambridge examination, which embraced a far wider field of subjects, and passed as a senior student; he was rejected for the engineer studentship, and boys, whose fathers probably were seamen or marines, took precedence of him. My impression is, that these boys, so to speak, are crammed up specially for the examination.

2189. (*Captain Commerell.*) Is the examination for engineer students a difficult one?—It is a difficult one.

2190. (*The Chairman.*) What pay do you think an engineer should receive on first entry into the service?—I think that the young engineers are fairly paid for the first twelve months, until they obtain at least that amount of experience.

2191. But you would make it progressive after that?—I would make it progressive after that.

2192. Have you formed any opinion, or considered the subject of pay, so as to give the Committee any idea as to what you would suggest as proper pay for them right up to the rank of chief engineer?—I would first abolish the first and second assistants entirely, and let there be only engineers and assistant engineers. I would let them be as assistant engineers for the first year of service, a probationary time, after which I think they might commence on the pay now given to the first assistant engineer, which is 7s. 6d. a-day, and then make it progressive up to 10 years to the present rate of 10s., and after that still progressively up to 12s. a-day.

2193. At what age do you think an engineer should be promoted to the rank of chief engineer?—I think between thirty and forty, and the nearer thirty the better for the service; at the present rate I think it is about forty-three.

2194. Having brought the engineers up to the pay of 12s. a-day, you think that they should be promoted to the rank of chief engineer at about the age of thirty-three or thirty-five?—Yes.

2195. What pay would you give them on first

promotion to that rank?—14s. a-day, I think; something in excess at all events of the pay up to 12s. a-day given to the engineer; it should certainly be 2s. a-day increase on the attainment of the rank of chief engineer. The great drawback is the difficulty, and indeed the impossibility, at the present rate of promotion to the rank of chief engineer, for him to serve the eleven years now necessary before he can count his time; he, therefore, can never attain the maximum amount of pay, as he will be too old to continue serving before he has sufficient service to entitle him to it.

2196. Have you any remarks to make upon the pay of inspectors of machinery?—I am rather diffident about that, but I think it rather inconsistent that a man should be a loser by accepting promotion. As an illustration: had I remained chief engineer in the "Devastation," I should be now getting the pay of an inspector of machinery, with the additional advantage of counting my time, while I am now on half-pay for an indefinite period.

2197. What half-pay do you get?—16s. a day.

2198. What pay would you be receiving if you were in the "Devastation"?—25s. a day.

2199. And your time would have been counting for retirement?—Yes.

2200. You speak about doing away with the rank of second class assistant-engineer; what advantage do you think would result from that?—It is simply a confusion of terms, I think.

2201. Do not you think that there is some advantage in having steps by which men are promoted from one rank to another, they are thereby enabled to pass over men, for a time, who have not earned their increase of pay or promotion?—I think all that is necessary might be met by the two classes I propose.

2202. And by making the increase of pay after a certain length of service depend upon the character of the men as well?—Yes; I think that would be an advantage.

2203. To have examinations to pass for each step?—Yes.

2204. Do not you think that periodical examinations might be useful if not carried too far?—Yes.

2205. Would you like to see the promotion to chief engineer as it is now, by seniority, or by selection?—Selection partly, I believe, would be an advantage, with a reservation as regards special service, and so on.

2206. Are you aware that our young engineers are educated and trained at the expense of the State until they leave Greenwich?—Yes.

2207. Do you think it would be advisable that they should serve the State for a certain number of years after their entry, and if so, how do you think it ought to be done?—I think that they should be bound; but I have no suggestion to offer as to how it should be done.

2208. Do you mean by a pecuniary bond?—Yes, by a pecuniary bond.

2209. Do you think that that bond should be made in a way so that it would pay the expenses of their education?—I think it should be an equivalent; that is the principle upon which it should be based.

2210. Have you any suggestions to offer to the Committee on the regulations respecting the treatment or promotion of engineers beyond those points which we have already discussed?—I think it would be a great boon and an advantage to abolish the engineers' mess berth, that would remove, as it were, a social barrier on board. I think that the fact of the engineer officers messing alone, and being so isolated from their brother officers on board ship, tends to demoralise them to a certain extent.

2211. Do you think that if the social status of the engineers be raised by nomination on entry that there would be any difficulty in abolishing the engineers' mess?—I think none whatever.

2212. Do you think that an advantage would result to the tone of the engineers if they could be estab-

lished in a building, so that they could reside and mess in the dockyard?—I think it would.

2213. Do you think that could be combined with a mess for the engineers who are now in the steam reserve?—I think it would be well worthy of consideration, and that it would be a great benefit.

2214. Have you been thrown in contact with engineers in the mercantile navy at all?—I have not intimately.

2215. (*Captain Dowell.*) You think it would be advisable to reduce the number of engineers; have you thought at all of the proportion the junior engineers should bear to the senior engineers?—I think after three or four years' service they might be accepted as seniors or take their place in any position in regard to engine-room duties.

2216. What I mean is, what proportion should the engineers and assistant-engineers bear to chief engineers in point of number?—Taking as a standard the present number of chief engineers, I should think about $3\frac{1}{2}$ to 1.

2217. If you reduced the number of engineer officers to such an extent as you propose, how many would you think it necessary to appoint to a ship like the "Devastation"?—I think I noted it down, it was nine engineers and six artificers, in the former case, and six engineers and nine artificers, in the present case, would meet it.

2218. How would you apportion the duties of the engineers?—As essentially officers of the watch, to direct the artificers in the manipulation of the machinery and so forth.

2219. Who had charge of the double bottoms in the "Devastation"?—One of the engineers, I cannot remember his name, for my time on board the "Devastation" was so short, and I had no charge whatever; but one engineer I know was set apart for that duty, and went through the double bottoms with me when I was making myself acquainted with the ship, but I think he combined that with other duties. I believe he had charge of some of the auxiliary engines on deck, the capstan engine, and so forth. I think, as far as I remember, that was the case; but I can speak very confidently with regard to the "Hotspur."

2220. How was that in the case of the "Hotspur"?—We had a senior engineer who was responsible to me for the double bottoms, and he also had charge of the cocks and valves. I instituted a system of examination of those cocks and valves periodically, once a month, and I also established a book wherein the engineer who examined either the double bottoms or the cocks and valves, or what not, signed his name to prove that he had done so.

2221. You think it advisable that there should be always an engineer in charge of all that part of a ship?—I think so.

2222. (*Captain Commerell.*) Do not you think that withholding all emoluments from engineer students for the first three years might act prejudicially upon many professional men who can hardly afford to keep their sons for that time?—I admit that it might bear hardly upon professional men.

2223. With a view to reducing the number of engineers, at what age would you allow the chief engineers to retire, and with what emolument?—At 50 years of age, certainly, I should recommend.

2224. With what amount?—Depending upon their service, and to count the whole of their junior time.

2225. (*The Chairman.*) What do you think should be the maximum at the age of 50?—£400 a-year, I should think, the present maximum.

2226. (*Captain Commerell.*) A chief engineer now can retire on £400?—I have not gone into that at all.

2227. And with a view to reduction, at what age would you allow engineers to retire, passed or otherwise?—At 40, if they elect to retire optionally,

bearing in mind that it is on condition of their serving in the reserve, if called upon to do so. I think that a system of competition for appointment to chief engineer would bring that about; that there would be engineers of 40 years of age, who, if they did not succeed in passing, would be very glad to accept retirement under such conditions.

2228. Do not you think that with competitive examination for officers of thirty-five years of age, we might lose a very valuable class of men?—It is possible we might, of course.

2229. (*Mr. Wright.*) If you were to retire now what difference would it make to your retired pay if you were allowed to count that five years of junior time, which you are not allowed to count now?—£50.

2230. (*Captain Dowell.*) Was that second-class time?—No; it was third-class time. I among many others was unfortunately situated. At that time the engineer was promoted from the rank of warrant officer, that was in 1847; and I happened to be abroad at the time, and could not present myself for examination for the new class of assistant-engineers; others who were in England had the opportunity of presenting themselves, and were passed, although some had only been six or nine months third engineers, and were promoted.

2231. Those are only individual cases?—Quite so; but it was brought about in that way, although it might appear that we had committed ourselves by having remained so long in the junior class.

2232. (*Mr. Wright.*) If the number of engineer officers were to be reduced on board ship, and engine-room artificers were appointed in their place, do you think that we should be able to dispense with all manual labour on the part of the engineer officers?—I think so, except in cases of emergency.

2233. In small ships, where there are only two engineer officers and one chief engineer, do you think that the chief engineer would object to taking his turn in keeping a watch?—I think so; after they attain the rank of chief engineer they expect to be relieved from the duty of keeping watch. You must consider that the engineer and chief engineer, when in charge of machinery, have a great deal of office work to do. Do not you think that on the attainment of promotion he should be relieved from that?

2234. That is one of the objections to increasing the number of chief engineers?—I am speaking from my own impression. I do not wish to convey to the Committee that these are the impressions generally with regard to the feelings of the chief engineers on that question; my feeling individually is that it would not work.

2235. (*The Chairman.*) Do you think that if the engineers now on the list of the age of 40 were offered retirement on £100 a year, that any of them who are not qualified for promotion would accept it; at present they have to remain five years longer before they can retire on £180 a year?—They would gain nothing by retiring in that case.

2236. Except independence, and being able to go and take service elsewhere?—But would it be desirable to get rid of them altogether? I do not think it would; at any rate I do not think it would be accepted so generally as with an inducement in addition to retire.

2237. What retirement would you offer a man at 40 years of age?—The present maximum: they should be "retired," not "pensioned."

2238. Do you think that the engineers of the age of 40, if they received the maximum pension of £130 a year, would take their retirement on the understanding that if the Admiralty required their services they should be bound to serve, provided their health allowed them to do so?—I think it would be readily accepted, although I have not taken the views of any one upon the subject; it is entirely my own view.

C. Iccly, Esq.,
R.N.

21 Oct., 1875.

(*The witness withdrew.*)

RICHARD HENRY SLEEMAN, Esq., R.N., *called and examined.*

R. H.
Sleeman, Esq.,
R.N.
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2238a. (*The Chairman.*) What position are you now holding?—I am chief engineer of the "Alberta."

2239. What is your standing?—1859.

2240. What age were you when promoted to the rank of chief engineer?—A little over 31.

2241. Where was your service before the "Alberta"?—In the "Vixen," in the West Indies, the "Penelope," on the coast of Africa, and the "Assurance" despatch gunboat.

2242. Were you chief engineer in the "Vixen"?—No; I was third assistant-engineer, and acting third engineer.

2243. Was there a chief engineer in the "Vixen"?—Yes, there was a chief engineer in her.

2244. What vessel were you in before the "Alberta"?—In the "Royal Alfred," as chief engineer.

2245. How long were you in her?—Altogether nearly five years, that is, superintending the fitting out of the ship and in commission.

2246. Were you there before Mr. Ellis?—Yes; I paid off with Sir Rodney Mundy's flag, and the ship's company were all changed.

2247. Had you any engine-room artificers in the "Royal Alfred"?—We had one, the complement was two.

2248. Have you any in the "Alberta"?—No.

2249. Have you had any other experience of the engine-room artificers in the service?—No, excepting the one in the "Royal Alfred," who was an exceptionally good man.

2250. Of what trade was he?—He had been brought up in a fitting shop.

2251. In the private trade?—Yes.

2252. That was his first entry in the service, I suppose?—We got him out of a frigate, the "Phoebe." He had served in her about two years.

2253. He was specially good, both as regards his character and qualifications?—Yes.

2254. What has become of him now?—I have lost sight of him entirely; he was paid off with the ship's company; they went home in the "Revenge," and I have lost sight of him since.

2255. Do you think he is in the service now?—I think he is.

2256. Have you any suggestions to offer as to an improvement in the position of the engine-room artificers?—I think that the present artificers we are getting are not what they should be; from what I have heard they do not come up to that type of man that I had with me.

2257. Whence do they chiefly come?—Some come from the outside and some from the dockyard.

2258. In what way do they fall short, or are they deficient?—In the work that they profess to know.

2259. It is not so much conduct as ability?—Quite so, in ability and practical knowledge.

2260. Do you think that the wages which they receive are not sufficient to ensure our getting good men?—I do not think it is so much the wages as the treatment which they are subject to.

2261. In what respects do you think that they might receive better treatment?—I have been given to understand that their messing arrangements are not so comfortable as they should be.

2262. Have you formed any opinion as to what could be done for them in the way of messing?—I think that if they were in a separate mess, with some one to attend upon them, and if their hammock arrangements were looked after, their time might be more profitably employed in the engine-room than in doing those mess duties themselves.

2263. You mean if they had some one to scrub their hammocks, and take them up and down, and clean their mess out, and look after their cooking?—Yes; I think that appears to be a grievance with them. We had a working boilermaker on board the

"Alberta," who consulted me about re-entry a few days ago; he was from one of the troopships. I questioned him as to how he liked the service, and he said that he liked it very much, except that he was too much under the control of the master-at-arms, and that the master-at-arms was constantly interfering with him in his mess arrangements, and in other little things of that sort, which irritated and annoyed him very much.

2264. You think that they feel those things more than any thing else?—Yes.

2265. If we wanted a large number of good men we must have some arrangement made to meet that then?—Yes.

2266. How many engineers are there in the "Alberta"?—Two.

2267. Have you been at sea in her?—Yes, to Cherbourg and Ostend.

2268. Who keeps watch in the engine-room?—The engineers in watch and watch, and sometimes, if necessary, both engineers and stokers for short distances, when it requires more care in stopping and starting. I may mention that the artificer in the "Royal Alfred" kept stokehold watch, and did it very well indeed; he looked after the boilers, and was very attentive to all his duties.

2269. Do you remember where he came from?—No, I do not; but it was from the private trade.

2270. When did you enter the service?—I entered the service originally as an engineer apprentice in 1842.

2271. What ships were you in?—I first served in the "Volcano" and went from her to the "Eclair."

2272. Captain Estcourt?—Yes; I was with him during that fatal yellow fever sickness in which he died; after which I went to the "Rattler," where I completed my time. From the "Rattler" I went to Woolwich, where there was a depot for us and workshops, and they had arrangements for our education and mechanical training. Mr. Dinneu had charge of the education of the boys.

2273. Do you consider that the present mode of training and educating the engineer students is satisfactory for the service?—I cannot speak from experience, as I cannot recall to my recollection any that I have had with me at all; those I have had with me have been principally engineers of old standing. I have been out of the regular service and in the royal yacht for the last 5½ years.

2274. Then you cannot give an opinion as to the results from personal knowledge?—No, I cannot.

2275. You have not formed an opinion, therefore, as to whether the regulations are satisfactory or not?—I have formed an opinion from what I have heard, that they are not so satisfactory as might be the case; when they go on board ship they are in many cases found not so competent as they should be.

2276. In what respects?—Especially as regards mechanical abilities.

2277. As workmen?—Yes. I have heard many chief engineers complain bitterly that they could get little or no result out of them in a practical sense; it would be some two or three years before they were really men of any value that you could place any dependence upon.

2278. That is the point in which you think they are deficient?—Yes.

2279. Which do you think would turn out a job of work the better, an engineer student or an engine-room artificer?—The artificer I had with me, I think, would unquestionably. From the description I have heard of the engineer students, I think that the artificers would be the best men.

2280. You have not been thrown personally in contact with the engineer students in the dockyard, have you?—I have seen them on board ship accom-

panying parties of men, but I cannot say, from personal observation, that the work which they have done is at all satisfactory.

2281. Do you think that the system of promotion at present in the engineer branch of the service is satisfactory?—Not at all.

2282. What would you suggest to improve it?—I would suggest that their numbers should be reduced. It is utterly impossible now for a junior engineer ever to rise to the position of a chief engineer at the present rate of promotion, taking into consideration that the number of chief engineers is limited to 170; the proportion is something about 50 in six years, and it is utterly impossible for the six hundredth ever to become a chief engineer.

2283. Then you would recommend a reduction in the number?—Yes.

2284. If you reduce the number of engineers, how would you replace them?—I would replace them by qualified artificers.

2285. Have you considered what you would think to be a satisfactory complement for the engine-room?—I will take the "Royal Alfred." Our complement was one chief engineer, five engineers, and two engine-room artificers. Four engineers, including a chief, and four engine-room artificers would be ample.

2286. If the number of engineers were reduced in those ships, how would you enable the young engineers on first joining to obtain a knowledge of the handling of the engines?—I would send them to sea in ships of the channel squadron.

2287. As supernumeraries?—Yes, the instructions state that they are not qualified if they have not served one year at sea.

2288. And therefore you would send them to sea?—Yes, in large ships, troop ships, and also in the channel squadron.

2289. Where they would keep watch in the engine-room?—Yes, and they should be examined on their duties connected with the engine-room on their return before they were confirmed as assistant engineer.

2290. How would you reduce the list of engineers?—By inducing several at the top of the list who have not passed to go by giving them a better retirement; as they have lost all chance of promotion, I would make it up to them in retirement, say 6*d.* a-day for each year served.

2291. Including all their junior time?—Yes.

2292. As second class assistants and all?—Yes.

2293. Is not in many cases the loss of their chance of promotion their own doing, that they will not qualify for promotion?—In some cases that is correct, but there are some at the top of the list who are qualified, and yet are still without any chance of promotion.

2294. Do you know the maximum amount of retirement that an engineer can receive now?—I think it is £130 a-year.

2295. Do you think that, if the engineers on the list of the age of 40 and upwards were allowed to retire on £130 a-year, many would accept it?—I am hardly in a position to answer that; but I think the amount should be increased.

2296. At present they cannot obtain that amount for five years, until they are 45?—Quite so; possibly some who have not passed might accept it.

2297. What would they do when they had retired, do you think?—Many of them would go into the mercantile marine.

2298. And go to sea?—Yes, or get situations on shore. If they had families, they could not exist on £130 a-year with any comfort; they must do something.

2299. What is their half-pay?—The half-pay of an engineer now, I think, is 5*s.* 6*d.* a-day, but I am not quite sure upon that point. I think they get 5*s.* 6*d.* and a retainer of 1*s.* 6*d.* a-day for provisions, to be within the port. They are not allowed to go away entirely, like the chief engineers; they are attached to the reserve, and are liable to be called upon at any time.

2300. Since you have been a chief engineer, for how long have you been on half-pay?—Not at all.

2301. You have been 16 years a chief engineer?—Yes, on the 26th of this month.

2302. Would it be to your advantage to be promoted to the rank of an inspector of machinery?—As the list is at present, with two unemployed, it would not be to my advantage to be kept on half-pay for some time; but if there were a prospect of immediate employment, it would be to my advantage if under 50; over that age, I do not think it would be.

2303. Do you think that you could reduce the number of chief engineers sufficiently to make promotion ordinarily quicker, or expedite it to any extent by offering those engineers at the top of the list, and over 40 years of age, advantageous retirement?—Yes, I think so. By allowing them to count all their junior time served from first entry, several chief engineers who are over 50 years of age would go at once.

2304. Are you aware how many engineers over 40 years of age there are on the list?—I am not; but I should not think there was a very large proportion.

2305. Have you any suggestions to offer to the Committee as to an improvement in the condition of the engineers in any way?—I think that the present rate of pay is very small indeed, and I think that they should enter at first on a much larger rate of pay.

2306. What would you recommend that they should receive at first?—Instead of the assistants starting as they do now on 6*s.* a-day, I think they ought to start upon at least 7*s.* 6*d.* or 8*s.* a-day, and go up to about 14*s.* a-day.

2307. As what?—As engineers or assistant engineers, whichever you like to call them.

2308. At what age would you promote them to the rank of chief engineer?—I do not think that any engineer should be promoted after 40 years of age. I think then he has lost all spirit and energy.

2309. Then what pay would you give him as a chief engineer?—He should start at about 16*s.* or 17*s.* a-day.

2310. And go up to what?—Up to 25*s.* or 26*s.* a-day.

2311. Do you think it is reasonable to suppose that when there is such a very large number of applications for the position of engineer students, and when the education of them is conducted at the expense of the government entirely, both practically and theoretically, that they should receive such a large increase of pay when they first enter, before they have served their country for a day, as 7*s.* 6*d.*?—I do; if you take the value of 7*s.* 6*d.* a-day at the present period, it is very little indeed.

2312. Considering that we can get three times the number that we have at present for 6*s.* a-day, what is the inducement for us to give them more when they first enter before they have begun to serve their country?—When we take into consideration the necessary expenses that a young officer is put to on first joining the service, I do not think it is too much. If he has no friends to give him an outfit, he must go into debt for it, he must get credit for it, and it will take him a considerable time to work that debt off. I think myself that 7*s.* 6*d.* a-day is little enough.

2313. Is he not, in comparison with other classes in the service, put at a great advantage; they have had to educate themselves, while he has not only received a good education free of expense, but he actually belongs to a less expensive mess when he first joins?—I think that the engineers' mess is a mistake altogether, and I hope yet to see the day when the engineers and assistants will mix with the other officers, and the engineers' mess be altogether abolished.

2314. Are you aware of the regulations for the entry of engineer students at the present time?—Yes.

2315. What are they; how are the students selected?—By competition only; by the educational test, and it is open to everybody, which I do not think is very desirable. I believe it is admitting a

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class of boys into the service which it is not desirable to have.

2316. Would you wish to see the candidates nominated by the Board of Admiralty?—I would, very much indeed.

2317. Do you think if that were done we should get men of a higher social standing?—I do.

2318. And do you think, if that were the case, the engineers' mess might be abolished?—I do; and I would also suggest that they should not receive so much pay as they do now, at any rate for the first three or four years. I would let their parents do something for them, and I think if that were the case a much better class of boy would be introduced. I think that many naval officers would be very glad indeed to have their sons sent into our line, but with things as they are now, they hold aloof.

2319. Do you think that they hold aloof on account of the companions of the lower class with whom they would have to associate?—Yes.

2320. Do you object to the boys of the Greenwich Hospital School entering into the competition?—Considering the source from which they are drawn, I do not think that it is desirable. I do not think, as they will become officers, that it is fair to the boys or the service, or to those with whom they will have to mess in after years, as they rise in position; I think that their connections will always drag them down. They may at times come in contact with some of their own relations on board ship who are in a very inferior position. It is utterly impossible for a boy to raise a member of his family to his position; therefore the boy must be dragged down to the position of that member of his family.

2321. Do you think that the young engineers when they first join the service, and who have been educated very highly at the government expense and well-trained, should be bound to remain in the service for a certain number of years after they join?—I think you might do away with that bond altogether and take down that barrier entirely. If you raised them from a different source, and made the service more attractive to them, they would be only too glad to enter a calling in which they saw a prospect of getting on to a superior position to that which they now see before them.

2322. You think that a good prospect in our own service would be better than any bond?—Yes, much better; to be brought in contact with their brother officers in the service would be better than all the bonds.

2323. Do the two engineers in the "Alberta" mess by themselves?—Yes, in a berth opposite the stokers; they have a companion common to themselves and the stokers.

2324. (*Captain Dowell.*) With regard to the engine-room artificers, you said that they complained about their mess; do you know where they did mess?—I do not know. I have an idea that they messed by themselves in the troopship under the troop deck, but I am not sure.

2325. Have you any suggestions to offer to the Committee as to the sort of mess which they should have?—I think that they should be separate and by themselves in some part of the ship where they can be comfortable. I would not give them a cabin, but I believe on board the "Sultan" they have a place in one of the flats berthed off; a sort of small mess place.

2326. Are they comfortable on board the "Sultan"?—Yes.

2327. And they are satisfied?—Yes.

2327*. (*Captain Commerell.*) Do you consider that a progressive increase of pay and better arrangements as regards their messing would be more popular among the engine-room artificers than giving some portion of them the rank of warrant officers?—Most decidedly; and I do not think that the elevation of the engine-room artificers to the rank of warrant officers would be at all conducive to the comfort of the service.

2328. Have you heard any complaints at all about their uniform?—Yes; I believe a frock coat, similar to that of the writers, instead of the short jacket as now worn, is what they want; a plain single breasted frock coat, the same as the writers wear.

2329. Among the numbers of engine-room artificers whom you have met, do you think that many would re-enter the service when their 10 years shall have expired?—I believe they would, if made more comfortable in their messing arrangements, and were given a slight increase of pay.

2330. What do you think would be their inducement for re-entering; the pension?—Yes, the pension; the man I spoke of was particularly desirous to come back for that reason; he had served three or four years, and he would like to come back for the sake of his pension after 20 years; that was the great inducement. I think with a little better treatment, increase of pay, and perhaps more under the supervision of the senior engineer or engineers, together with the pension after 20 years' service, a good body of men would be induced to enter the service.

2331. What would you consider to be a fair rate for an engine-room artificer to receive on entry?—From 5s. 6d. to 6s., going up to 7s. 6d. or 8s. a day.

2332. (*The Chairman.*) Do you know what they have now?—5s. on entry, and they go to 5s. 2d.

2333. (*Captain Commerell.*) What you propose would be of course after 10 years' service?—Yes.

2334. From your experience of the young engineers, do you consider them altogether better behaved as officers than was formerly the case?—I do; the majority of them, certainly.

2335. Do you consider that the life which they lead in the dockyards and in the neighbourhood of seaport towns is conducive to their fitness for taking the position of officers?—I must confess that I have a partiality for their being more under discipline.

2336. Do you see your way to that being made practicable?—I think that they might be put under discipline at a dépôt of some kind, as cadets, or brought in some way immediately under discipline instead of being allowed to do as they please on first joining.

2337. Is it your opinion then that the present engineer students are rather inclined to run wild at the dockyards?—Yes, they are inclined to be a little that way, and I am very sorry to say, from what I have heard, that I think they marry much too young; some of them before they are out of their time.

2338. (*Mr. Wright.*) Had you anything to do with the drawing up of this statement of the case of the naval engineers, and with the suggestions therein contained?—Yes.

2339. Have you any statistics bearing upon the subject as to the additional cost that would be incurred if these rates were adopted?—I believe, to carry out the scheme, it would cost between £50,000 and £60,000.

2340. (*The Chairman.*) The annual cost?—For the first year it would be that, but it would not be so much afterwards.

2341. And in that comparison is the saving of £12,000 for a separate engineers' mess included?—I think so.

2342. (*Mr. Wright.*) One statement is, "That engineers' mess berths be abolished in all ships; engineers under eight years' service in all ranks to mess in the gun-room; engineers over eight years' service in all ranks to mess in the ward-room. By this means a sum of about £12,000 per annum would be saved in servants' pay and provisions, mess-traps, lights, &c."?—Yes; that is so.

2343. (*The Chairman.*) Would not the servants be required for the additional officers who are appointed to the gun-room mess? They would want a good many additional mess-traps, and an allowance for lights in proportion to the number of officers?—I do

not think that that part of it would cost quite so much; some portion of that must be taken off.

2344. (*Mr. Wright.*) Does this £50,000 or £60,000 include also the increase proposed in half-pay?—Yes.

2345. And for reducing the number of engineers and increasing the number of chief engineers?—Yes; I have now taken a rough estimate of what is required.

2346. (*The Chairman.*) Would you advocate doing away with the rank of first and second class assistants?—Yes, I think so.

2347. What would be the object of that?—I think that the fewer the denominations of the officers, the better they would be understood.

2348. Is it not rather advantageous to have steps of promotion?—Yes, but I think that the denominations of assistant engineer, and engineer, would be quite sufficient with that of chief engineer. If you made them assistant engineers at first, they would have a commission at once.

2349. Is it not the case that the young assistant engineer, when there is a large number in a ship, has not very responsible duties to perform?—But there are times when you have to detach them for very important duties.

2350. (*Captain Commerell.*) In drawing up that list of suggestions did you consult the pay of the relative ranks of the other branches in the service?—Yes.

2351. All branches?—Not all branches.

2352. Which did you principally consult?—The medical branch.

2353. Are you aware that the pay proposed to be given to a chief inspector afloat amounts to considerably more than that given to the deputy inspector of hospitals?—I am not certain whether it does.

2354. Do you know what is the highest pay of a deputy inspector of hospitals afloat?—Not quite.

2355. The full pay is £1 13s.?—Indeed.

2356. (*Captain Dowell.*) Did you, in making out that scale, take into consideration that the surgeons have all had an expensive education, which they have had to pay for themselves, while the engineers are educated at the expense of the country?—Yes; but their value and responsibilities are very great when in charge of large ships like the "Devastation," or as chief inspectors in the steam reserve.

2357. (*The Chairman.*) A lieutenant who has charge of the watch has equal and almost greater responsibility, and yet you exceed his pay a very great deal?—But a lieutenant gets his promotion so much earlier, and has a prospect of a flag in the future.

2358. Do you think that the present engineers and assistant engineers are persons who could, with advantage, be introduced into the gun and ward room messes?—I think that several of them could be.

2359. How would you make the choice?—I cannot say; but I think a large proportion of them might be.

2360. (*The Chairman.*) You must remember the young married men?—I quite agree with you; it would be rather against them.

2361. (*Mr. Wright.*) Would you make it compulsory for them to join the gun or ward room messes?—Not yet. I think that the introduction of a better class of students would meet that in course of time.

2362. One of the proposals is that the number of engineers should be very much reduced; how do you propose to carry that out in practice?—I think if the present list of chief engineers was increased, and chief engineers were put into smaller vessels than is now the case; that is to say, not according to the nominal, but according to the indicated horse-power, say all vessels of 700 indicated horse-power, the difficulty, to a certain extent, would be met.

2363. Still that would give but a small increase?—It would increase the list by about 40 or 50; from about 210 to about 250; then, with a little more inducement offered for them to retire than they have now, a few would be cleared out every year. I would give an increased pension, say, from £130 up to £160; up to the pay they were led to believe they

would realise sometime or other when they joined the service, and which they are kept out of through want of promotion.

2364. You would leave the education optional?—Yes, but I think if you put a barrier, as it were, before engineers, that is to say, did not promote them if over 40 years of age, many even would elect to take the increased time given them in the shape of pay, and go.

2365. Supposing a number retired after 20 years' service, that would be 10s. a-day, it would be giving them a premium of, say, £50 to retire?—Yes.

2366. Looking at it from a service point of view, is not that rather an expensive way of retiring them?—The same was done by Mr. Goschen's scheme some time ago, to meet the case of the redundancy of the lieutenants' list.

2367. Are you aware at all whether any large number of engineers are prepared to retire on less than that?—I stated that I thought they would. If you did not promote any engineer of over 40 years of age to the rank of chief engineer, I think that many would be induced to retire.

2368. (*Captain Commerell.*) You would make it a *sine quâ non* that no engineer over 40 years of age should be promoted to the rank of chief engineer?—Yes.

2369. Do you think that would be popular amongst the engineers generally, both in the upper and lower ranks?—I think so, with all time to count from the time of entry. I would do away with midshipmen's rank entirely when they had completed their education, and make them rank with sub-lieutenants.

2370. (*Captain Dowell.*) When would you consider that they had completed their education?—After a probation of 12 months at sea.

2371. (*Mr. Wright.*) If you appointed chief engineers to smaller ships, as you propose, what kind of complement would you give a ship, indicating, say, 800 horses?—One chief engineer, one assistant, and two engine-room artificers.

2372. How would you divide them into watches?—The engineer and the two engine-room artificers must take the watches.

2373. Would the chief engineer object to take a watch, do you think?—In small vessels, if the engineer fell sick, and a strain was put upon the two engine-room artificers, I do not think he would.

2374. The difficulty might be to get properly qualified engine-room artificers?—Yes, that is my opinion, you should certainly have the very best men as engine-room artificers. If you reduce the number of engineers you must have undeniably good men as engine-room artificers.

2375. As a matter of fact, chief engineers recently promoted would rather be appointed to a ship under those conditions, to take a watch occasionally, than remain on half-pay?—Yes, I think that is so; the present rate of half-pay for junior chief engineers is deplorably bad, 6s. a-day, I think it is; and sometimes they are men with large families, and have to live on that for 12 months. I have heard of one or two rather distressing cases, as no doubt you can realise very well. Fancy 6s. a-day to bring up a family on. I know one case where a man had to take his children away from school, and did the duties himself, while he was on half-pay.

2376. (*Captain Commerell.*) Can you tell us whether this scheme, "The case of the naval engineers," has received the sanction of the engineers generally?—It states that it represents the views of the majority of the engineers in the navy.

2377. Was there any scheme, other than this, prepared in any other port?—I do not know of any other.

2378. (*The Chairman.*) Was that drawn up at Portsmouth?—Yes, after conference with the officers at Plymouth and Sheerness.

2379. (*Captain Dowell.*) Do they all belong to the club at Portsmouth?—A large number of them do. I do not think they expected that all contained in that scheme would be carried out. They are only

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R. H. suggestions, but there is no doubt that the engineers
 Sloenian, Esq., are underpaid.
 B.N.
 21 Oct., 1875. 2380. (*The Chairman.*) Do you think that if the
 engineers were retired at the age of 35 or 40 by
 being offered inducements to go, that it would be
 desirable to have a retainer upon them for service in
 the event of war?—Yes, unquestionably.

2381. Up to what age would they remain suitably
 employed?—Up to 50 years of age.

2382. Do you think it would be beneficial for both
 the service and the officers to be retained in that
 way?—Yes, and the engine-room artificers should
 likewise be retained. I would go down as low as the
 stoker mechanics for a reserve.

(*The witness withdrew.*)

[Adjourned to the 26th instant at 10 o'clock.]

TUESDAY, 26TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERCILL, R.N., K.C.B., C.C.

G. FINLAISON, Esq., Secretary.

CAPTAIN THOMAS BRANDRETH, R.N., called and examined.

Capt. T. 2383. (*The Chairman.*) You are in command of
 Brandreth, H.M.'s ship "Excellent," I believe?—I am.
 R.N.
 26 Oct., 1875. 2384. What was the last ironclad ship that you
 commanded?—The "Lord Warden."

2385. What staff of engineers and engine-room
 artificers had you in her?—One chief, five engineers,
 and two engine-room artificers.

2386. Have you ever served in an iron ship in com-
 partments?—No.

2387. From your experience in the command of
 large ships, have you ever considered whether it
 might be desirable to alter the proportion of engineers
 and engine-room artificers?—I have had it proposed
 several times that the staff of engineers should be
 reduced, and their places taken more or less by engine-
 room artificers.

2388. What advantage do you suppose we should
 derive from that?—The advantage of reducing the
 number of engineer officers, and allowing others to
 come on for promotion; most likely, too, we should
 be able to enter a superior class of engineer
 officers.

2389. Have you had any experience lately of the
 comparative merits as workmen of the young engineers
 and the engine-room artificers?—No.

2390. Then I suppose you could not say which you
 consider to be the better workmen?—No.

2391. Are you aware of the present system of
 entering engineer students for the navy?—Yes, they
 enter by competition through the dockyard.

2392. Are they selected in any way otherwise than
 by competition?—Not the least.

2393. Do you think it is possible, while we have this
 class of engineers in the service, that they can be
 introduced into the ward and gun-room messes
 generally?—No. I do not think that there is selection
 enough in the entry of engineer students.

2394. Would you wish to see the candidates for
 entry nominated by the Board of Admiralty, as is the
 case with every other class in the service?—Certainly;
 it should not be allowed to be wholly competitive.
 I believe now that anybody comes in who can just
 pass the examination.

2395. Supposing that by the candidates being
 nominated by the Board, the social status of the
 engineers was very much improved, do you think
 we might, at some future time, abolish the engineers'

mess?—If the number of engineers were reduced,
 and a higher class entered, I should say that it
 might be done. The places of the junior engineers
 might be taken by the engine-room artificers.

2396. Are you acquainted with the course of
 training that our engineers now pass through in
 order to qualify them. By "training," I mean the
 practical and theoretical work which they have to
 perform?—I know nothing beyond the Admiralty
 circular.

2397. You are aware that they have to remain
 for six years at the dockyards to undergo a course
 of training?—Yes, and then to go to Greenwich.

2398. Would you wish to have that practical
 training modified or dispensed with in any way?—
 No. I believe that the practical training is not
 considered sufficient, particularly in the case of those
 who study for two years at Greenwich. They have
 less practical knowledge than the others.

2399. Can you inform the Committee how and
 where the engine-room artificers messed in the "Lord
 Warden"?—At one time they messed with the chief
 petty officers, but latterly they messed with the
 master-at-arms. Messing with the chief petty officers
 did not work well.

2400. Then the chief petty officers of the executive
 branch had a mess to themselves?—Yes.

2401. And the master-at-arms and ship's steward
 by themselves?—Yes.

2402. And the engine-room artificers joined the
 master-at-arms latterly?—Yes.

2403. Where did they mess?—The civil chief
 petty officers' mess was amidships in the fore part of
 the lower deck, and the executive chief petty officers
 had a screened mess, the foremost mess on the port
 side of the lower deck.

2404. Are you aware why the first arrangement
 did not work well, or on which side the complaint
 was?—The complaint was on the part of the artificers,
 that they were not in the mess allowed them by the
 regulations.

2405. Do you remember whether they had to clean
 their own mess out?—Yes, to a certain degree.

2406. In the first instance?—Yes, in the first
 instance, less in the second.

2407. In the second instance they had a boy to
 attend upon them, I suppose?—Yes, they had a boy

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also in the other instance; the chief petty officers' mess is allowed a boy.

2408. Supposing it was deemed desirable to increase the number of engine-room artificers in the service, do you think that we should have a difficulty in obtaining them at the present rate of pay?—No, I believe not at all.

2409. But do you think it would be advisable to increase that pay after a certain period of service?—Yes, as there is no increase of rank or position, I would give them increased pay.

2410. Would you rather give them increase of pay than an increase of position?—Yes; I would rather give them increase of pay, because I think if we gave increase of position they would gradually work into engineer officers again.

2411. Have you heard of any complaints on the part of the engine-room artificers as to their pay, position, or treatment on board ship. I do not care whether they are well founded or not, but any complaints?—No; I have been quite out of the way lately of hearing about them. In the "Lord Warden" we had very good engine-room artificers, and very few were changed; there were no complaints; but I suppose the "Lord Warden" was an exceptional ship rather, being the flagship: in fact I have always been in a flagship.

2412. Do you think it would be desirable to put the engine-room artificers as much as possible under the chief engineer, both as regards their messing, sleeping, and their work, or would you let them mess on the lower deck with the other chief petty officers?—I should prefer to keep them apart, and to let them have a distinct standing of their own.

2413. A distinct mess place?—Yes, and standing also; as the chief petty officers consider that they have jumped up to their rank without serving for it, and never look upon them as their equals. That is a sore point with the chief petty officers, and they do not like the engine-room artificers being treated as of equal standing with themselves.

2414. If the number of engineers in the service were reduced, and the number of engine-room artificers increased, from what source do you think we should obtain an increase of engineers for the navy in the event of war?—I suppose they could be obtained from the merchant service by the attraction of pay for a temporary period.

2415. Do you think it would be a popular thing with the engine-room artificers, or an inducement for them to join the service, if, after 10 years' service at sea, they were placed in the dockyard to work in the factories on the same pay as they received at sea, on the understanding that they were to go to sea when required, either during peace or war?—To take what position in the factories?

2416. The position of fitters or boilermakers. You must bear in mind that many are drawn from the factories?—Yes; I think that would be an inducement and a good thing, because then the whole of them will be there to go to sea in the event of an emergency; you cannot get armourers.

2417. (Captain Commerell.) Do not you think that the reason you cannot get armourers is because all the armourers are merged into engine-room artificers?—Perhaps so.

2418. Do not you think that one of the best armourers is quite equal to an engine-room artificer?—Yes, quite; a good armourer is a capital man.

2419. (The Chairman.) Do you know of any instance in the Mediterranean, where an engine-room artificer has kept watch in the engine-room as an engineer?—No; no instance has come under my notice.

2420. Are you aware that the promotion from the rank of engineer to that of chief engineer is now very slow?—Very slow; after about 22 years' service. I think, therefore, the engineer must be more than 40 years of age.

2421. Do you think that the age of 43 is later than

desirable for men to be promoted to the rank of chief engineer?—Yes, I think so; it is too old.

2422. Have you any suggestions to offer to the Committee as to the best means of reducing the list of the present men, the engineers especially, but of course one would act upon the other?—I believe that engineers are now in charge of engines, which, properly speaking, in many cases ought to have chief engineers, from the nominal horse power of the engines being so low as compared with the actual power. If the chief engineers were appointed by the actual horse power you might employ more of them, and thereby clear the list of engineers by promoting more to chiefs.

2423. Therefore, by making the list of chief engineers, it would expedite promotion?—Yes, it would expedite promotion and give a better position and better pay sooner.

2424. Do you think that, in any small vessel of which a chief engineer was placed in charge of the engines, he ought to keep watch?—He should keep watch if there was not a sufficient number of engineers or qualified engine-room artificers to do it.

2425. Are you acquainted with the regulations as to the pensions of engineer officers upon retirement?—Not very well.

2426. Have you thought about any improvement in that respect?—No.

2427. Have you any suggestion to offer to the Committee as to an improvement in the position of the present engineers in a large ship, where the engineer and assistant engineer sleep in hammocks, and wash on their chests, I suppose?—They have a bath-room.

2428. (Captain Dowell.) In the "Hercules" the chests were in the bath-room?—I do not think that the messing or sleeping arrangements are objectionable; they are very good.

2429. (The Chairman.) Although they may appear objectionable where men remain engineers to the age of 40 or 43; yet, if the promotion were expedited, the objection would not obtain with younger men?—No.

2430. Have you considered any question connected with the engineers and engine-room artificers that would be of advantage for the information of the Committee besides those points which we have already discussed?—I think it would be an advantage to enter some engineers from the general trade of the country, and that not all should pass through the dockyard. I also think there ought to be a distinct understanding as to whether the engineer officers should do practical work or not; in some cases they are made to do it, and in other cases they do not do it at all, just according to the ship in which they are. I believe myself that the engineer officers ought to understand and do practical work.

2431. If engineers are entered from the private trade would you insist upon it that they should pass the examination, both in practical and theoretical knowledge, that our present engineer students have to pass before admission into the service?—Yes, they should pass the same examination.

2432. Do you think it likely that we should get good men from the private trade at the same rate of pay as our own engineers, bearing in mind that the outsiders have had to bear the expenses of their apprenticeship, and training and education, while our engineer students are put to no expense whatever?—Of course the education which is given to them is a point which must be considered as a great boon; but I believe a certain number of men from the outside would enter.

2433. (Captain Dowell.) In the "Lord Warden," what were your arrangements for the muster and inspection of the engine-room artificers?—They mustered as chief petty officers.

2434. Had they anything to do with the stokers?—They fell in opposite to the stokers.

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2435. Were all your stokers under the engineers?
—Yes, under the engineers entirely.

2436. They kept the division lists and everything?—Yes, they attended to the clothes and divisions.

2437. With reference to the leave of the engine-room artificers, were they exactly on the same footing as the other chief petty officers?—Yes; they gave their names to the master-at-arms, on the understanding that they had seen the chief engineer first.

2438. Was any complaint ever made about that, or did the engine-room artificers object to go to the master-at-arms?—I remember that they did object at one time.

2439. Do you think that their objection was a valid or reasonable one?—No; I think it was not. I looked upon it as a frivolous objection, and said as they were of the same rank as the other chief petty officers, they must go through the same form; it was merely to note who was in and who was out of the ship.

2440. Have you thought at all whether it would be for the benefit of the service if the senior engineers, who, when the ship is at sea, have a good deal of dirty work to do and a watch to keep, especially in small ships, where they sometimes have to keep watch and watch, whether it would be possible for them to have a cabin with bunks in it to sleep in instead of a hammock?—I have always looked upon bunks as objectionable, and do not consider that there is room enough to allow them cabins; a ship is always pressed for cabins.

2441. (Captain Commerell.) As the flow of promotion is at the present time, do you consider that the pay of engineers is adequate; they begin at 6s. a-day, and go up to 10s. a-day?—No. I think that as they are kept for so very long as engineers, that the pay ought to be increased according to the length of service. I should think that the present maximum rate of pay, namely, 10s. a-day, ought to be increased after 12 or 14 years' service as engineers.

2442. At what age do you consider engineers should be promoted to the rank of chief engineers?—As a rule, at about the age 35. That would be a fair limit, I think.

2443. Is your experience of engine-room artificers such that you think they are at present a desirable class of men, or do you think that we might recruit them from the midland counties or northern counties?—I understand that we do get them from Glasgow and Liverpool, and such places. The other day when we were short, a circular was sent to Glasgow and Liverpool, and more than were required entered in a very short time.

2444. We only get a very few, and from the evidence which has been given, it appears that the circular had hardly been understood up in the northern counties?—When a report was made from the dockyard that they were short, and leave was obtained to enter men from Liverpool and Glasgow, the numbers required were filled up in a very short time, and notice had to be given that no more men were required. I looked over Captain Waddilove's correspondence with regard to that about ten days ago.

2445. You think that, as arrangements are at present, we succeeded in getting a sufficient number of men?—Yes, more than we wanted. As I understood, notice had never been given in the great manufacturing ports, such as Liverpool and Glasgow; when it was given, more than enough came.

2446. (Captain Dowell.) Do you think that the present engine-room artificers we have will re-enter the service after their ten years shall have expired?—

Yes; I think if their pay be increased a little they will remain in the service.

2447. (The Chairman.) Would you wish to see the engine-room artificers raised to the rank of warrant officers?—No; I think you would enter into the same difficulties with regard to messing and cabins and so on, as you are in at present.

2448. (Captain Commerell.) Do you think it would be good to have an engineer officer travelling about the country in order to pick up the best men for the service that could be obtained?—Yes; and that would be a good opening for some of the retired officers.

2449. (The Chairman.) Do you think that the engine-room artificers' dress, now, is satisfactory?—Yes.

2450. They appear to dislike going about in a jacket; do you think there is anything reasonable in that, or would you substitute a pea-jacket or tunic for their present dress?—I should not have any objections to a tunic, if it gave them satisfaction.

2451. (Captain Commerell.) Can you give us an idea as to the size of the engine-room artificers' chests in the "Lord Warden," or whether they made any complaint about the size of them?—I do not remember any complaint; the chests were of the regular size, as near as we could get them.

2452. There have been one or two regulations about the size of their chests?—Yes.

2453. (The Chairman.) Do you think that the engine-room artificers should have a chest as large as that of the master-at-arms, bearing in mind that they have a good many working dresses, and have to change their clothes a great deal?—Bearing in mind that they have places or lockers in the engine-room, I should think not.

2454. Have you any further suggestions to offer to the Committee?—No, I have not. I do not know whether you would bring into consideration the pay of the higher classes, such as the inspector of machinery.

2455. Have you any remarks to make with regard to the pay of the higher classes?—I think that it ought to be increased with length of service. I think it is a great inducement to people if they have a little increase of pay with length of service.

2456. To what maximum do you consider they should rise?—I should think that an inspector of machinery might rise about £20 a-year.

2457. Up to what?—Up to about £600 a-year; at present it is £456 a-year, and if in the dockyard it is £510 a-year. The chief engineer of a ship gets a good deal of extra pay and store allowances, and so on; and it is possible for him, in that way, to get more pay than an inspector of machinery.

2458. Mr. Ellis got more than 22s. a-day pay, 3s. for being in charge of engines, and 5s. for being in the flagship?—Yes, that is 30s. a-day.

2459. (Captain Commerell.) If it went up to £600 a-year, it would be exactly the same pay as the deputy inspector of hospitals receives 33s. a-day?—Yes, there are only a few of them, and it would be a great inducement for others to work up to that position.

2460. (Captain Dowell.) Would you at all recommend an alteration of the title, or do you think that the title of inspector of machinery is a satisfactory one?—Quite.

2461. There is a feeling amongst the engineers that they ought to be called engineers and assistant-engineers, and that the first and second class assistants should be done away with; do you think there would be any advantage in that?—I think that one class is sufficient. I think that "second class" is almost always an objectionable term.

(The witness withdrew.)

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RICHARD CHAPMAN, Esq., called and examined.

2462. (The Chairman.) What rank do you hold?—I am a clerk in the admiral-superintendent's office.

2463. Does your duty connect you at all with the engineer students?—Yes.

2464. How long have you been connected with them?—Ever since they were entered as engineer students, since 1863.

2465. How are the candidates selected for competitive examination?—Everybody who applies for a nomination has a paper given to him which he fills up and sends to the admiral-superintendent's office.

2466. How is the word "*respectability*" interpreted?—I do not know that any question is asked, but everybody who applies has a paper given to him to fill up, according to the instructions at the foot of this form (*handing a form to the Chairman*) that shows all the particulars required.

2467. Is any objection ever made to any student on account of his parentage?—No.

2468. (*Captain Dowell.*) Have you not some guarantee or referee as to character?—Yes.

2469. (*The Chairman.*) Are steps taken to obtain the opinion of the referees as to character?—No.

2470. It is entirely left to be decided by competition?—No enquiry is ever made from the admiral-superintendent's office; if that were so about two-thirds of the boys would be rejected, and it would be a great waste of time to do so.

2471. Of those who are successful no inquiry is made?—No; not from the admiral-superintendent's office.

2472. Is there a large number of applicants?—Yes; generally about 30 for 10 vacancies, that is three to every vacancy.

2473. When once the engineer students have entered, have you in your position in the admiral-superintendent's office anything further to do with them?—No; nothing at all.

2474. Has this mode of entry been in force ever since 1863?—Yes.

2475. (*Captain Dowell.*) Have you anything to do with the entry of engine-room artificers?—No, nothing at all.

2476. (*Captain Commerell.*) Has it ever come to your knowledge that young men who are not of good character, have competed successfully for the position of engineer students?—No; I have never known of any case; very often a clergyman will be the referee for a boy, if he knows him, because sometimes the sons of engineer officers will compete for a vacancy, or the sons of the foremen of the yard.

2477. (*The Chairman.*) Do you keep a list at the dockyard of the parentage of the boys for candidates?—Yes, we keep a copy of the nomination paper; we send that paper to the Admiralty, and I believe it goes from there to the Civil Service Commissioners.

2478. (*Captain Dowell.*) You do not refer to the person who is given as a referee?—No, never.

2479. (*The Chairman.*) If the referee be a clergyman or householder, the fact of his being informed, is considered to be sufficient?—Yes, I have always considered it sufficient. I have always considered that the Civil Service Commissioners or the Admiralty would apply to the referee. I think that a boy must be very well educated to pass for an engineer student, and he must have been brought up at a good school.

2480. (*Captain Commerell.*) Is not there a little cramming?—Perhaps so. Mr. Barber is very successful with his boys; two, three, and four of his boys pass every time.

2481. What class of young men has Mr. Barber in his school generally?—Many of them are the sons of engineer officers and foremen of the yard, and tradesmen's sons as well.

2482. (*Captain Dowell.*) Is Mr. Barber a regular crammer?—Yes; I consider so for these examinations.

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(*The witness withdrew.*)

PATRICK GRAHAM LAMBERT, ESQ., R.N., called and examined.

2483. (*The Chairman.*) Where are you now serving?—In the "Lord Warden."

2484. Have you been to sea in the "Lord Warden"?—Yes, fully a year before we were paid off.

2485. What complement of engineers had you?—We had five and one chief; we had three artificers, one being supernumerary, as it was the flagship; that was at request, it was not allowed by the Admiralty complement.

2486. Were any of your engineers first or second-class assistants?—No, none.

2487. Were they all engineers?—Yes, all old men.

2488. How long have you been a chief engineer?—Since 1859.

2489. When did you enter the service?—In August 1846.

2490. As what?—As a third engineer.

2491. What age were you when you were made a chief engineer?—34 years of age.

2492. Are you aware at what age they are now promoted to the rank of chief engineer?—They vary from 45 to 49 and 50.

2493. Not so old as that, I think?—Some are as old as 50; very few are under 45, some of the lucky ones possibly.

2494. At what age, for the benefit of the service, do you think they should be promoted to the rank of chief engineer?—Not later than 42, after they have been 20 years in a subordinate position I do not think they are ever fit for the work.

2495. Supposing that you had the re-organising of the system, at what age do you think a man should be promoted to the rank of a chief engineer?—I think at about 35; then possibly they have had fifteen years service.

(3572)

2496. Were you satisfied with the engine-room artificers you had in the "Lord Warden"?—No, I was not.

2497. What trades were they?—I had three; one was a blacksmith, and he was no use at all; and the other two were tolerably good, one was a fitter and the other a boilermaker.

2498. Where did the blacksmith come from?—From Portsmouth, I think.

2499. Was he a stoker-mechanic?—He was an artificer.

2500. Had he entered as such?—Yes.

2501. Do you know his previous career?—No.

2502. Where did the other men come from?—I think they came from Portsmouth yard factory; the father of one is a boilermaker in this yard now.

2503. Would you wish to see any change in the relative number of engineers and engine-room artificers?—I think it would be good for the service to have an additional number of engine-room artificers entered, and a proportionate decrease in the number of engineers. Now they are at work from 6 o'clock in the morning till at least 5 at night, at all times.

2504. Supposing in a large ship the number of engineers was reduced, do you think that the engine-room artificers could keep watch in the stokehold?—Yes, under the superintendence of the engineer of the watch.

2505. Has it ever come under your notice that an engine-room artificer has taken charge of the engine-room in a small ship?—In small ships, yes, many; and they give satisfaction, I think.

2506. On an emergency, or when required, you think that there would be no objection to an engine-room artificer of a certain standing, who had passed an examination as to his knowledge of the engine-

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P.G. Lambert, room, keeping watch in the engine-room?—None
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2507. Do you think that there would be any difficulty in getting engine-room artificers in increased numbers at the present rate of pay?—I think so, and a very material difficulty. I do not think you would get them at all.

2508. Are you aware that at present we get as many as we want?—No, you cannot get good ones; there are a great many in the service at the present time who are not fit.

2509. You do not perform any work in the reserve, I think?—No, none at all. I find that the boilermakers and fitters that we have in the service are, as a rule, very good and trustworthy men; but the blacksmiths are rough, and break things.

2510. Should you think we ought to be able to get sufficiently good blacksmiths amongst the stoker-mechanics?—Yes.

2511. Should you recommend that the engine-room artificers, if we wished to get good men, should be either fitters, boilermakers, or coppersmiths?—Yes.

2512. (*Captain Dowell.*) You would erase the blacksmith altogether?—Yes, in the "Lord Warden" we had stokers who were better men than the blacksmith artificer.

2513. (*The Chairman.*) What steps would you recommend being taken in order to get better men as engine-room artificers in the service?—You will have to offer them better pay.

2514. What should be the pay on first joining?—5s. 6d. a-day for the first few years, and then to have progressive pay.

2515. At the end of ten years what would you do?—I would give them something more to go on with for twenty years.

2516. Would you recommend their being entered as at present for ten years, or for a shorter service?—I think they ought to have a probation in the dock-yard, so as to know that they were not coached and able to do well only one certain piece of work.

2517. Would not their qualifications be able to be ascertained in the steam reserve, if they took care?—I think so, but I think that the factory is a better place, especially with strangers; they have a better means of doing their work there; they might do their work in the factory and be supervised by a naval officer.

2518. Is there any other point besides pay that you would recommend?—Their messing at present is very faulty.

2519. How, in your experience, have they messed?—They have never messed in their proper place.

2520. (*Captain Dowell.*) Which is their proper mess?—They are supposed to mess with the master-at-arms and other chief petty officers; that is what the circular says; but I have never known them to mess with the master-at-arms.

2521. (*The Chairman.*) In the "Lord Warden" they messed with the master-at-arms?—Not in my time.

2522. Were you in the "Lord Warden" with Captain Brandreth?—No, afterwards. In the "Volage" they gave them a mess of their own, and then they messed with the tailors and shoemakers instead of with the chief petty officers.

2523. Where would those men, of whom you have had experience in a man of war, wish to mess?—I do not know that they wish to have any particular place. In large ships there are many places, such as the engine-room flat, which could be appropriated to their use.

2524. Do you think that they would prefer to mess in an engine-room mess by themselves, rather than have anything to do with the lower deck?—Yes; there appears to be some jealousy with regard to the master-at-arms that they cannot get over; whose fault it is, I do not know.

2525. In what respect?—They were always before the lieutenant. I remember the deck was dirty, or the iron of their mess was not clean, and they said they had no time to do it.

2526. Do you think it would simplify the matter if their messing, and all other arrangements, were under the dominion of the chief engineer?—I am quite positive about it; there is no doubt of it.

2527. Do you think that, with the object of getting thoroughly good men as engine-room artificers, a slight progressive increase in the pay, and good treatment as regards their messing arrangements, would be sufficient to insure it?—Yes, I think so; they have nothing to complain of as regards their duties alone, although they have a good deal of work and long hours.

2528. Would you say that the good engine-room artificers are better or not, as workmen, than the young engineers?—They are more useful.

2529. Are they better workmen; by that I mean doing their work more neatly and quickly?—Yes; but you can put them to different kinds of work that you cannot put officers to.

2530. Could you keep them working after hours?—Yes, you can keep them all day long, from the time the hands turn up until possibly an hour after supper.

2531. Have you had any experience of the engine-room artificers being sea-sick and unable to work?—Yes, of their being sea-sick; the leading stokers then help.

2532. Do you think that their dress is satisfactory?—They had better have coats; they are old men, or men of from 25 to 40 years of age.

2533. Do you think that a pea-jacket or a tunic would be a better dress for them?—I do not know where the tunic ends and the frock-coat begins; the master-at-arms is allowed a tunic, but he wears a frock-coat; if they were allowed to wear tunics you may depend upon it they would go into frock-coats.

2534. Do you think that a pea-jacket would please them?—It is not dressy enough for them.

2535. Do you think that the promotion of engineers at present is satisfactory?—No. In fact, there is none at all.

2536. What steps would you recommend being taken to improve it?—I think that the list of chief engineers might be enlarged, and that they might be employed in smaller ships. Nominal horse-power is very deceptive in our days. Ships now work up to eight times their nominal horse-power, and when the rule was first made it was only about three and a quarter or four times.

2537. You would rather be guided by the indicated horse-power in small ships?—Yes.

2538. Do you think that if engineers were promoted earlier to the rank of chief, and put into smaller ships, they would feel any objection to keep a watch in the engine-room?—I think they would. In those small ships they only have one engineer besides the chief, or three at the most, including artificers; the engine-room artificers, those who have certificates of fitness to keep watch in the engine-room, do so. I never had one yet that I could give that certificate to.

2539. Are you aware whether the engineers in charge of small ships now keep watch in the engine-room?—Very few, unless it is in the gunboat class, where it is required, because there are only three of them.

2540. You mean that chief engineers put into small ships would do the same duty as engineers in charge now do?—Just the same. The engineer, where there are three assistants, does not keep watch.

2541. Do you think that would be sufficient to cause a satisfactory flow of promotion?—No, not unless you reduced the number.

2542. How would you reduce the number?—By allowing the older ones to retire.

2543. Have you ever considered what retirement the senior engineers would accept to go now?—I have not.

2544. The highest retirement that they can get now is £130 a-year at the age of 45?—Yes.

2545. If that retirement were offered to men at the age of 35, do you think they would go?—Yes; I think that the 35 ones would, but the 45 ones would

not be pleased with it. The retiring rate is £6 a-year, and it would require 22 years' service, age then being from 45 to 50 years, in order to get that £130.

2546. What is the reason why a number of engineers do not qualify for the rank of chief engineer?—Because they are bound to remain until they are 50; they cannot retire at 45 if they have passed for chief; most of them have taken either Dr. Woolley's, or the practical test, when they are confirmed, and if they should think of becoming chief engineers they could pass at any time.

2547. Pass what?—The practical examination. They have to pass two, an educational, and a practical examination; most of them have passed one.

2548. Which one?—The educational one.

2549. Do you think that if a man had not passed the educational test early, he could pass it when over the age of 40?—I think so, unless the test was altered very much.

2550. Are you aware that any chief engineers have declined promotion to the rank of inspector of machinery?—Yes.

2551. Have you ever been offered it?—It has not come to my turn yet, but I was asked my opinion upon the subject by Admiral Drummond, and I said that if I were asked I would refuse it, as the pay of a senior chief engineer was equal to the pay of an inspector of machinery.

2552. Do you think that any system of promotion can be satisfactory when men decline to take promotion to the rank of chief engineer, and afterwards to the rank of inspector of machinery?—Yes, I think so; if that step were offered to them as young men, but it would be no use to me at 51 years of age.

2553. Why would you decline to become an inspector of machinery?—Because the pay is not equal to the responsibility, and I should have to serve until I was 55 or 60 years of age.

2554. Supposing the pay of an inspector of machinery was increased, would you be inclined to take promotion then?—Not at my age. I have been 30 years in the service, and am quite tired of it.

2555. When will you be able to retire?—I could have retired a month or two ago, but I wanted to complete a certain time.

2556. What retirement will you go on then?—On about £360 at the present rate for 30 years' service.

2557. If you were made an inspector of machinery, would you be on half-pay for any time?—Possibly for two years.

2558. What would be the half-pay you would receive?—16s. a-day. I should be a great sufferer.

2559. Do you think that the pay of engineers is satisfactory?—No.

2560. On entry, or after a term of service?—I think on entry it is sufficient, because then they have not learnt to be useful.

2561. To what do you think their pay should rise before they become chief engineers?—If kept to the present age, I think 14s. a-day.

2562. Supposing by any system they were promoted to that rank at the age of 35 or 36, what do you think their pay should be?—If they have progressive pay it would depend upon their service entirely; that would be the only honest way of arriving at it.

2563. Is there any other point connected with the subject which you think is worthy of attention. What is a chief engineer's half-pay?—That is very small indeed.

2564. Do you think it is felt as a source of grievance by the chief engineers that they are on half-pay?—Yes, they are on half-pay for twelvemonths, on 6s. a-day, and they are mostly men with large families.

2565. Are you aware of the regulation for the admission of engineer students now?—I see by the navy list what they are now.

2566. How are they selected?—By competitive examination so far.

2567. Competitive examination only?—Yes.

2568. Are they selected with any reference to their parentage?—No, none whatever.

2569. Do you think that is a good system?—No.

2570. What would you recommend?—I think there ought to be some selection as to respectability.

2571. That they ought to be nominated by the Board of Admiralty like other classes in the service; would that come up to your view?—Yes, I think so.

2572. Do you think that there is a desire on the part of engineers to be admitted to the gun and ward-room messes, or to do away with the engineers' mess entirely?—Yes, very strong indeed.

2573. Do you think that the young married men with large families, and there are many of such, would like to go to the expense of a ward-room mess?—I think so; I think that many for the sake of their position would do so; besides, it is assumed that their pay will be increased.

2574. We have been given to understand that a great many engineers, with families, now in the service, have great difficulty in maintaining themselves, even in the engineers' mess?—The engineers' mess is nearly as expensive as the ward-room mess; there are fewer in it, and it is very expensive to keep up.

2575. Looking to the parentage and the social position of a certain proportion of the engineers now admitted into the service, do you think that they could be satisfactorily admitted into the ward-room mess?—I think there are many exceptions; those at present would give a great deal of trouble before they came to any good.

2576. If the system of nomination were introduced, and the position of the engineers was improved, and their promotion quickened, do you think there would be any objection to their being thus admitted to the ward-room mess?—I think not, as it is possible they would be the sons of officers of different ranks, and the number would be greatly reduced.

2577. Have you any suggestions to offer to the Committee as to the mode of training the engineer students?—I think that the present mode, as it is carried out in the dockyard, is very good; but the students in the service have been neglected a great deal.

2578. Do you think at present it is improved?—Yes; they have improved wonderfully since I have been here this last time. At Plymouth they were very much neglected. I was on the examination two years ago and it was, I can assure you, a very painful duty.

2579. Have you been for any considerable time of your service in the Steam Reserve?—Yes, for several years, backwards and forwards. I was a short time at Plymouth, and a short time, two years, in the reserve at Portsmouth, and about a year at Sheerness.

2580. Do you think that any advantage would be derived from a mess being formed, or a means of messing being afforded, to the young engineers in the steam reserve?—Yes, I think it would be a very good thing, until they had been at least for one commission at sea. They know nobody about their ports, unless it is their own relatives, and many of them are objectionable.

2581. Have you any intercourse with the engineer students in the dockyards while they are under instruction?—No, I have not. I knew several at Plymouth, two years ago, when in the "Lord Clyde."

2582. Do you think there would be any objection in allowing the engineers in a ship to occupy a cabin with three berths in it, instead of their sleeping, as now, in a hammock?—I think if they could be given cabins it would be better for them than hammocks; if the senior ones had one to themselves, and the junior ones half to themselves; anything would be better than what they have at present.

2583. Do you think that the pay of an inspector of machinery is what it should be?—No, I do not.

2584. What would you suggest that an inspector of machinery should rise to as a maximum?—To about £600 a year, or £650 a year possibly—his position

P.G. Lambert, now is not worth accepting, and there are very few chief engineers who would take it.

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2585. Would you be in favour of promoting engineers to chief engineers by selection instead of by seniority?—No, I do not think it would work well.

2586. Looking to the important duties that are required of chief engineers, do you think that every man when he comes to the top of the list of engineers is qualified to be advanced to the rank of a chief engineer?—Not all; but nine-tenths of them are, if promoted in time; at their present age they are not as they have lost their nerve and other things, zeal, &c.

2587. Are there not other things besides that required, such as readiness of resource and quickness of perception and knowledge?—Those they ought to have acquired before.

2588. Would you see any objection to a system by which two-thirds were promoted by seniority and one third by selection?—No; but by selection it is difficult to get at the best men, and you make the others dissatisfied. For instance, a captain recommends his chief engineer for promotion, and he is then promoted, although he may be far from being the best man.

2589. Do not you think that the Admiralty have a means of getting at the qualifications of an engineer better than upon the report of one captain?—Yes, they have got their annual reports. These reports are trustworthy only as regards conduct.

2590. They have a record, have they not, of the whole of his career from the time of his first entering service?—Yes, I think it is very wrong to shut the door against merit entirely.

2591. Against its being advanced young?—Yes.

2592. Have you had any experience in the "Lord Warden" of any of the engineer students from South Kensington?—Only of one, and he was supernumerary for a short time; by the bye, he was not from South Kensington I remember, but came from the dockyard.

2593. You have had none from South Kensington?—No; all ours were senior men. In the "Volage," my last ship, I had only one assistant and the others were engineers.

2594. (Captain Dowell.) I think you stated what you thought the pay of an engine-room artificer should be?—Yes; I think it should be from 5s. 6d. to 7s. 6d. per day.

2595. Did you state that you think the engine-room artificers would re-enter at the end of their 10 years' service?—Yes, I think they would re-enter.

2596. Do you think they would re-enter as things are now, and if no alteration were made in their rate of pay?—There are so many openings outside the service that I think the best men would leave.

2597. But they have a prospect of pension in the service?—The pension, I think, wants modifying somewhat; it is very small.

2598. Have you any idea of the pension which they would receive at the end of 20 years' service?—I think it is about £45 or £50 a year after 20 years' service. They are skilled labourers, and, if good men, ought to have more.

2599. Do you think it would be of advantage to the service if the engine-room artificers and factory men in the dockyard were amalgamated?—I think the engine-room artificers might be employed in the Steam Reserve workshops if not employed afloat, and kept constantly at work.

2600. Do you see any objection to their being employed in the dockyard factory?—I am afraid they would acquire bad habits in the factories; they would get into the dockyard step again, which had been rubbed out on board ship, and they would come back to us as raw material, and have to be broken in again.

2601. Considering that the engine-room artificers are for your purposes mainly skilled workmen, is not their work very much the same as that of dockyard factory men?—Yes, exactly the same.

2602. Do they get through more work than the men in the dockyard factory would?—Yes, they do much more; they do twice the amount of work.

2603. As skilled artificers, which is the better workman, the factory man or the engine-room artificer. Which would you take of the two?—I should first have to know sufficiently if both were equally trained, and if that were so, I would take the man from on board ship.

2604. As a rule, do you think they are as good men?—Yes. They get into a better system altogether. They do their work without being watched, and do it honestly; give an honest day's work.

2605. What are the grievances of which the engineers in the service complain?—The great grievances are want of position and want of pay; want of pay is the greatest.

2606. You have already said, I believe, that you think the pay ought to be progressive?—Yes.

2607. Have they any complaint about the time which they are allowed to count?—Yes, great complaints, especially among the older officers. None of us can count our time until over 26 years of age. The first five years of our time has been lost.

2608. In a few months you said, I think, that you will retire?—In about a year.

2609. How much time will you then count?—I will then have been 30 years in the service, and I shall scarcely count 25 years. I have lost five years of my life.

2610. (Captain Commerell.) You will retire in 1876, counting time from 1846?—Yes.

2611. (Captain Dowell.) How is it that you lose five years?—All my third class time is lost: all officers in the service in 1846 who were not in England suffered severely from that cause, just when the present rank commenced. Those absent from England got no promotion for many years, and those at home got two or three steps in as many months; they were on the spot, and there was a great demand for them.

2612. Supposing you had been more fortunate, and had been in England, what time would you then have lost on retirement?—Possibly three years; in the olden time six months as a third were considered sufficient to qualify you for a second engineer, and many were chiefs at two years from the time they joined the service.

2613. What do you consider would be the proper proportion between engineers and chief engineers, in order to cause a sufficient flow of promotion?—I think the chief engineers ought to be about 210 to 220, and the others about 450, about double.

2614. Do you know anything about the engineers of the mercantile marine?—No, nothing at all; but I have met many of them in the large companies, such as the Peninsular and Oriental, and West Indian Companies.

2615. (The Chairman.) You do not know what their regulations are?—No, but I have taken passage in several of their ships.

2616. (Captain Dowell.) From what you have seen, do you think that they are entered from a higher class socially, than the engineers who are now entered in our service?—I think not; it is only the better class of them that become chief engineers.

2617. You had no double bottom in the "Lord Warden," I think, had you?—Not in the "Lord Warden." We had iron doors right throughout in the "Volage"; we were in compartments; under the screw alley we had a double bottom.

2618. (Captain Commerell.) Do you adopt that "case of the naval engineers"?—The only objectionable part that I see is, that they begin too high for the students.

2619. This is not according to your idea, then?—I think if they were to begin at perhaps 7s. instead of 9s., in fact reduce the whole scale, the thing would work very well.

2620. Do you think that in laying down what they consider to be a fair rate of pay, they consulted the rate of pay of the other ranks in the service?—I think so. I only saw that this morning for the first time, and then I noticed that the inspector's pay was £1 18s., which is just the pay of a paymaster in a

flagship. I do not know how much the highest rate of pay is, as I have been away from England of late.

2621. Do you think that the inspectors of machinery, chief engineers, and engineers in the service, would be satisfied if their pay were raised in the same way and under the same scale as other ranks in the service, taking into consideration that they receive their education at the expense of the State, also having regard to the different ages at which they attain their different ranks?—I think so; they think that they are injuriously treated now, because they are left out in the cold.

2622. Do not you think that 12s. a-day over the pay of a deputy inspector of hospitals is rather too much?—Yes, it is.

2623. (*Captain Dowell.*) Do you think that this pamphlet has received the general assent of the majority of the engineer officers?—I think of the majority, yes; but they have certainly commenced too high in stating 9s. at first entry.

2624. You came from the Mediterranean, I think?—Yes.

2625. Do not you think that the Mediterranean officers were consulted upon these matters?—I think not. I am not a member of the club, so that I do not know how things are going on; all these things are done by meetings of a committee.

2626. Do they ignore all officers that do not belong to the club?—Oh, no.

2627. (*Captain Commerell.*) Would you give the Committee your ideas relative to our chance of obtaining engineers and engine-room artificers in case of war?—I think that they ought to be brought back until they come to the age for compulsory retirement. I think they would be all willing to return.

2628. (*The Chairman.*) Those who retire optionally?—Yes; until I arrive at the compulsory age, I am quite willing to return to serve in case of war, and I think others would be also.

2629. (*Captain Commerell.*) Where do you think we ought to get men from?—We should have to go into the manufacturing districts for them.

2630. Would you propose that they should be entered in the service merely temporarily?—Yes.

2631. And paid accordingly?—Yes; we did that during the Russian war, but unfortunately for the general good many of those temporary service men were retained in the navy.

2632. Do you consider that that is the cause of the system being very much upset?—Yes, and it dissatisfies the others. Those men were entered with much higher pay than the others had; when they first entered they had more pay than the chiefs, and retained it during the whole war, and then started afresh upon the present ranks; a great deal of harm was done in that way.

2633. Would you be inclined to recommend that the engine-room artificers should be confined to three trades: fitters, boilermakers, and coppersmiths?—Yes, decidedly so; but very few coppersmiths. I would only have sufficient for the flagships, as supernumeraries in the flagships and for service in steam reserves.

2634. You think that they should be confined, in fact, to engine fitters and boilermakers?—Yes; but we must be careful about entering boilermakers. What I call a boilermaker is an angle-iron smith and fitter. The riveters and other trades amongst boilermakers are not skilled labourers in the true sense. The angle-iron smith or plater ought to be the man, and no blacksmiths.

2635. You think that you could get a blacksmith cheaper?—Yes; he is not the right man, and we do not want him. The boilermaker is the better man of the two, even at the anvil.

2636. In fact, he is a sort of superior blacksmith?—Yes.

2637. And a man who has also served his time at boilermaking?—Yes; he is a handy man to assist the engineer, and do everything requisite in keeping the machinery in repair.

2638. Have you any ideas relative to the rank of the engine-room artificers?—Not beyond their being chief petty officers. I do not know what else you could make them.

2639. Do you think it would be almost better to give them more pay and no rank at all?—I do not approve of their having a higher rank than that of chief petty officer; I do not approve of their being made warrant officers. Being officers, they might object to work.

2640. From the evidence put before us, we find constantly that the engine-room artificers and the master-at-arms appear to clash?—Yes, they always do. I believe, first, it was on account of the badge on the cap. The master-at-arms had none until recently, and I fancy there was some little jealousy there.

2641. (*The Chairman.*) The engine-room artificers had?—Yes. They started with a badge upon their cap, and now the master-at-arms has got it; but that sort of feeling ought by this time to have died out. I believe they have always had some difficulty about the cleanliness of their messes.

2642. (*Captain Commerell.*) You are aware that the difficulty of making regulations which would separate the engine-room artificers from the rest of the chief petty officers would be very great, whereas if they had no relative rank at all, all difficulty would be removed, and they might be kept more under the direction of the chief engineer?—Yes. But relative rank is necessary, on account of their prize-money or anything of that sort. If they messed with the master-at-arms they would never have any difficulty about their mess, because his mess is always cleaned.

2643. But you see that the master-at-arms in many ships, for the purposes of discipline, messes by himself?—You will find that the steward and writer and schoolmaster generally mess with him.

2644. Where that can be avoided, I think you will find that the master-at-arms and his boy generally mess alone?—Yes. I have never known the artificers to mess with him in my experience.

2645. (*Captain Dowell.*) Where did they mess in the "Lord Warden"?—In the same mess with the chief petty officers, near the master-at-arms.

2646. You had great difficulty, I think?—I had some difficulty. They told me that the circular said so and so, and I found the circular, after great trouble, in an old navy list, which said that they were to mess with the master-at-arms and other chief petty officers. I was told that 20 fellows could not mess with the master-at-arms, and I said, if 20 fellows cannot mess with him, why should those men be the ones that are excluded. Let them mess with him and the others go away somewhere else.

2647. (*Captain Commerell.*) Do you know the secret of their not liking them to mess with the master-at-arms?—I do not. They have no knowledge of cleaning messes, and I think that sort of work ought to be taken from them.

2648. In the "Lord Warden" did they clean their own mess?—They never cleaned it because they were always at work. We were simply a large workshop. The boilers were broken out in all places. As chief petty officers they ought not to be expected to clean their messes. I know that they were uncomfortable in their mess, and were frequently before the commander in connection with it. These men have not been accustomed to the sort of work, cleaning messes and scrubbing hammocks, and so on; and they ought to have a hammockman.

2649. In a small ship there is a small number of chief petty officers, but in large ships, where there is a large number, just fancy what it would be if each one had a hammockman?—That is the objection to relative rank; still, by robbing them of their rank, you rob them of their prize-money and everything else. I think by giving them a mess place, a servant to attend upon them, and putting them under the chief engineer, that everything would go straight.

2650. You think there would be no difficulty in

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making them comfortable as far as messing and leave arrangements are concerned?—As regards leave, they might be taken away from the master-at-arms, because when leave is given to the ship's company the engine-room artificers very frequently cannot go, and when the chief engineer can spare them the master-at-arms will not allow them to go. In the "Lord Warden" the whole leave of the engine-room department, with the exception of the stokers, is entrusted to the chief engineer.

2651. What do you think would be the retiring allowance necessary to be given to the engineers at the top of the list in order to induce them to go?—It has been proposed to give them 6*d.* a-day for every year's service. A lieutenant with their service would get about £300 a-year. We are the only officers who cannot count all our junior time.

2652. What would you consider would be the maximum that it would be necessary to offer them to retire?—From £180 to £200 a-year for long service, over 20 years.

2653. Do you think that many of the engineers at the top of the list, who have attained the age of 40, would go upon that?—I think all of them would.

2654. Would you keep the rank of chief inspector of machinery a purely honorary one as at present?—I think it ought to be paid, as they have extra duties. The inspector is in fleets, and the chief inspector would be in the steam reserve.

2655. Would you pay the inspectors according to the time they have served, or would you have the rank of chief inspector and give it a separate pay?—I think if you gave it a separate pay it would meet all the requirements of the case.

2656. You consider that the rank of chief inspector should not be merely honorary, but should carry with it an increase of pay?—Yes, quite so.

2657. (*The Chairman.*) You said that one of the complaints of the engineers is their want of pay, but I do not think you have said whether you consider that complaint to be well founded?—I think it is. If they had been treated as they were led to believe they would be when they entered the service, as regards the time when they would be made chiefs, they would be in receipt of 13*s.* or 16*s.* a-day.

2658. On what principle do you think that the scale of pay in any rank in the service should be based?—Upon service.

2659. Do you consider it should be in proportion to

the other ranks in the service, in proportion to their requirements, or in proportion to the performance of their duties?—In proportion to the performance and nature of their duties. Other officers with whom they rank are young officers, who attain to a very high position after a certain number of years, while the engineer remains in exactly the same position as he was probably 12 years before, and only has 1*s.* a-day rise in his pay.

2660. Considering that under the present regulations the Admiralty can get the services of any number of engineers of the present class, what inducement is there for the Admiralty to increase the pay of the class?—In order to keep their skill. When you enter a man from the shore, he has none of the skill which is possessed by an officer who has been in the service from 12 to 20 years, and who knows how to work well and does it to the satisfaction of the captain or commander of the ship in which he is.

2661. You mean by that remark that after they have served a considerable time in the service they are worth more?—Yes, they are more valuable as they have all their service experience.

2662. Did not these young officers who are now on the engineers' list know what pay they would receive when they attained the ranks of engineer and chief engineer?—No.

2663. Why did not they enquire?—They did enquire, but the time in the junior ranks then was only about eight or nine years; now it comes over twenty years.

2664. When they first joined the service they expected to be promoted to the rank of chief engineer at a much earlier period than is now the case?—Yes. What the engineers are dissatisfied with is being kept so long in the same position; not a tenth part of them can ever become chief engineers, and they will be obliged to go. One thing that I think the engineers would like, would be a step in rank or retirement, which would be of advantage to their widows.

2665. Do you think there is a strong feeling in the service about their retirement being called "pension" instead of "retirement"?—Yes, they make a great point of that.

2666. Why?—Because they fancy that they are treated like seamen.

2667. And their names do not appear in the navy list?—Quite so.

(*The witness withdrew.*)

Mr. GEORGE JAMES WEEKS, R.N., called and examined.

Mr. G. J.
Weeks, R.N.

16 Oct., 1876.

2668. (*The Chairman.*) What is your standing as an engineer?—27th June, 1868.

2669. What was your last service at sea?—The "Salamis" in China.

2670. As an assistant?—No, as an engineer part of the time, and acting chief the remainder.

2671. Was there a chief engineer in the "Salamis"?—Yes, but not while I was acting.

2672. Were there any engine-room artificers?—No.

2673. I daresay you have considered the subject of the promotion of engineers to chief engineers, and the general position of the engineers in the service?—I have.

2674. Will you give the Committee the benefit of your ideas upon the subject as to an improvement in their position?—I consider that the age for promotion to the rank of chief engineer is too old; the man has arrived at an age too old for promotion and for turning into a new life, for it is a new life altogether; he has been in a subordinate position too long to fit him for it. I consider that my age is the most suitable one for the service for a man to be promoted at.

2675. What is that?—32. I have been about

12½ years in the service. I am, I think, about the most fortunate engineer in the service, being the youngest of my standing; there is no one that can come near me. At the present time, the duties of an engineer on board ship are not compatible with the number of years service he has; for instance, in my first ship, the "Himalaya," there were two engineers who were junior to me. I then went to the "Simoon," where there were three juniors, and then to the "Salamis," where I was junior engineer. As the commission wore on, the others were superseded; one was sent junior to me, then two junior to me, and then I became acting chief engineer of the ship and remained as that until we returned to England. On returning to England I went to the college, and there were five engineers, but only one junior to me. After leaving the college, I was appointed to the "Thunderer," and I am junior there now. Now, I do not think that any other class of officers are served in that way, that is to say, after having been in a ship as the senior engineer, reduced to a junior position. Just fancy an officer being the first lieutenant of a ship, and then to go to another ship as the fourth lieutenant, and this repeated. I know that the difficulty with

engineers is very great, and although I have been 12½ years in the service, and have passed all my examinations very successfully, there are now 330 engineers before me for promotion.

2676. When do you expect to be made a chief engineer?—I have no prospect of it, although I have unfortunately passed for chief engineer, and am consequently compelled to serve five years longer than if I had not passed, without any increase in pay or pension.

2677. Is the rate of promotion to the rank of chief engineer getting slower than was formerly the case?—Yes; it is decidedly getting slower.

2678. Have you any opinion to offer to the Committee as to the scale of pay of engineers?—Yes; the pay should certainly be progressive.

2679. To what pay do you think an engineer should rise?—I should limit the age of promotion to the rank of chief engineer, and an engineer who is not likely to be promoted on account of age to the rank of chief should have the same pay as a junior chief engineer, which should not be less than 14s. a-day. The junior chief engineer has a prospect before him, while the other man has none.

2680. Would you promote a man from the rank of engineer to that of chief engineer by selection, or by seniority?—I cannot imagine promotion by selection for engineers, as I cannot understand in what direction selection should lie.

2681. Do not you think that some men are better than others?—Yes, very often; but what should be the test?

2682. The way in which a man performs his duty?—Yes; but is that the usual test for selection? Our present test is the educational certificate.

2683. That is one influence, but should you like it to remain the only influence, without any reference to the way in which a man does his duty?—I think that a man who has misbehaved himself should be passed over by a man who has endeavoured to behave himself properly.

2684. You said that you would like to see the engineers promoted more expeditiously to the rank of chief engineers?—Yes.

2685. What means would you suggest in order to arrive at that?—I should suggest a reduction in the number. The engineers are not properly employed on board ships, in my opinion; a large portion of the work which necessitates such a large number of engineers in a ship could be very well done by artificers holding a lower position and having less pay.

2686. How would you reduce the number of engineers?—By restricting their promotion to the age of 40 or less, and allowing a number of engineers to retire, the same as Mr. Childers allowed other officers to retire by his scheme.

2687. By restricting the promotion to 40 years of age, how would you do that?—I should say that at 40 years of age they should be allowed to retire.

2688. At what age do you think that a man ought to be promoted to the rank of chief engineer?—Certainly not over 32 or 33 years; that would be a very good age indeed; that is to be seen plainly by the engineers one observes about here.

2689. If all engineers over 40 were retired by compulsion, what number do you think that would take off the list?—I think about 68 at once.

2690. What retirement do you think that engineers of 40 years of age and upwards should receive, in order to induce them to retire voluntarily?—My estimate has been formed from conversations which I have had, more than anything else. I think about 6d. a-day for every year's service; in the case of engineers qualified for promotion, a difference should be made, because they qualified for promotion so many years ago, and are disappointed men. The others are not qualified, and I question whether many could qualify now.

2691. If a man has qualified for promotion to the rank of chief, and is compelled to retire, you would give him more?—Yes, he should be allowed to

assume the rank of chief, and retire on the same scale as chiefs. J.G. Weeks, R.N.

2692. What retirement do you think would induce men to leave, do you think that 6d. a-day for every year's service would do it?—Yes, I think so; that appears to be the general feeling.

2693. What do you call service?—All time, I call service.

2694. Whether at sea or in harbour?—Yes.

2695. Would you make any difference in sea and harbour service?—An engineer's service is the same in harbour as it is at sea. I consider that engineers might be more profitably employed in the steam reserve than they are at present; while on harbour service engineers may be well and profitably employed.

2696. Do you think they would do as much work as the engine-room artificers in harbour?—The work should be entirely different.

2697. If they were employed in harbour in what way would you suggest employing them?—An engineer should be employed profitably, and he is not employed profitably when employed as an engine-room artificer.

2698. How would you employ him?—I think on new ships, such as the "Inflexible." Until she is launched, the engineer has not an opportunity of examining her, but I think she might be watched by the engineer from her building upwards, and much valuable information gained.

2699. How many engineers would you employ in that way?—I think that the whole of them here in the steam reserve, perhaps about 30, might be employed in that way.

2700. Would you call it profitable to the service to keep 30 men in harbour for the purpose of watching the building of the "Inflexible"?—Not for that purpose only; the exigencies of the service require about that number in this harbour as supernumeraries, and those might be profitably employed in that way; but not only on the "Inflexible," there are other ships as well; the "Thunderer" is another ship. It would be very profitable employment, because the knowledge obtained could be utilised hereafter.

2701. Do you think that the government would be authorized to keep men on full pay, and let them count full sea-time for watching the building of ships only, while not taking any part in the work?—There is a number of engineers required now for certain duties on board ship, and that probably could be extended greatly in the way I suggest, I think, with benefit to the country; moreover, their stay in the reserve is usually very limited.

2702. On board the "Inflexible"?—Yes; but she is not the only ship; there are others building and fitting out here. There is not a large number employed now as artificers, rather a small number; but still there is more profitable employment in engineering. I do not consider that engineers should be only mechanics; an engineer requires to be something more than a mechanic on board ship, as he is there thrown upon his own resources, and he has to know something of the whole of the trades in the profession; an engine-room artificer has to know his own trade only, and to be good at that. I think that the amount of talent among the engineers might be utilised by the country in various ways. Take the extreme case of the "Vanguard"; in my opinion, the raising of her is purely an engineering question; although, from the depth of water she lies in now, it may be beyond the power of naval engineers to make practicable suggestions in that direction. There are many cases worth consideration. If that ship had been lost on a foreign station and in shallow water, I do not think it would have been beyond the ability of the engineer to have raised her; or, at any rate, to have saved the most valuable part of her; that is an engineering question of a kind that requires to be cultivated for the benefit of the country, and not for the benefit of the individual.

2703. Do you think that the class of men who are

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entered at present are the best class of men that could be obtained for the engineer service?—No; there you strike at the root of the evil at once.

2704. What suggestion would you make as to getting a better class?—I think that the entry should be by nomination, like that of other officers; that the candidates should be nominated instead of being entered, as they are now, with a note of respectability.

2705. Do you think that you could get sufficient candidates?—I think so. I cannot see why the engineering profession should not be made as attractive as any other branch of the service. It is not so now evidently, because it is the only branch of the service which is not courted; it is the only branch in which the candidates are bound to serve for a certain time; and there must be something wrong when an officer is bound to serve for a certain time.

2706. Do not you think that when a young man has received a very high education at the expense of the country, instead of paying for it himself, that the country has a right to insist upon his services being given, or else that he should repay the expense of that education?—The country certainly has a right to act in that way, but would it not be more advantageous to the country to make the position that he has to enter upon one to which he could aspire instead of one that he has a desire to throw off.

2707. Do you think that when a man has received his education at the expense of the country, extending over seven, eight, or nine years, that that man should not make the country some return for that education which he has received?—Yes, certainly.

2708. Or else pay for that education?—Yes.

2709. Is not that the object of binding him?—I do not quite understand what is the object of binding him, except that the service is not attractive to him.

2710. Did not you say that they were bound to pay a certain sum?—Yes.

2711. Are you not aware that that is for paying for their education, if they do not choose to serve their country?—No, because it is far below.

2712. It is far below, but still it is just as much as they can get?—Yes.

2713. Do you think there would be any hardship, after having educated men gratuitously for the profession, if the government were to tell them that they had no further use for their services?—There would most certainly be a hardship, unless they were incompetent.

2714. Why?—Because I think a person getting his education in that way strives hard to make the most of it.

2715. For himself?—For the country which he has hereafter to serve. Whatever he does for himself must be also for the good of those whom he is going to serve.

2716. That depends upon whether the government wishes for his services?—Yes, but that sudden discharge would be a hardship in any case, for it would be a surprise.

2717. If it were sudden?—Quite so.

2718. Supposing engineers retired at the age of 40, to what service do you think they would take in order to earn their livelihood?—I do not know; that must remain for each individual to answer. I think each one's native town or country would settle that question in a great measure, for there is a very large field open for engineers in England now.

2719. Do you think that the pay of the young engineers on entry is sufficient?—No, it is small; they are worth more.

2720. What would you recommend on entry?—It is 6s. now, and the next step is 7s. 6d.; 7s. 6d. should be the pay on entry.

2721. Do you know anything about this case of the naval engineers?—I have seen it.

2722. Do you agree with it?—All but the high scale of pay; that met with my objection at once, on account of the gross sum required being more than the government would, in my opinion, grant.

2723. (Captain Dowell.) Have you any idea why

they put the rate of pay so high?—No, I know nothing about it; I am quite ignorant of this.

2724. By whom was it drawn up; was it done with the approval of the majority of the engineers in the service?—I am quite ignorant of the matter.

2725. (Captain Commerell.) Do you belong to the club?—No.

2726. (The Chairman.) Have you had any acquaintance with the engineers of the mercantile marine?—Not a great deal, a little in China.

2727. Could you give the Committee any information as to their pay and position?—The only thing I know about it is this; the engineer who would have joined the service six months after me, that is to say, he would have been 18 months junior to me now, failed to pass, the doctor refused him a certificate on account of his having varicose veins in his legs, and he is now the chief engineer of a large steamer going to Bombay and Calcutta. He told me a few months ago that his regular salary was £300 a-year, and that that was more than doubled by his perquisites and allowances, and in a short time his savings would allow him to retire on a competency, which he could not have done in the service, as, if allowed to retire, his pension would be only £72 a-year now.

2728. Do you think that if the engineers were allowed to retire they could find service in the mercantile marine to any extent?—Yes, I think so, to any extent.

2729. Supposing we wished to reduce the list very much, what scale of retirement would you suggest for a chief engineer?—The present rate of retirement of a chief engineer, I think, is very satisfactory, if allowed to count all their junior time; to lower the age for retirement I think would be one thing, but of course it is natural that a chief engineer will try to attain the highest rate of pay. There is a clause attached to that scheme of Mr. Childers by which chief inspectors and inspectors of machinery are allowed to add £10 a-year to their service. I think that should be applied to the chief engineer on attaining the relative rank of commander; in that case he would probably have about 17 years as a chief engineer, and 2 years of that he would be ranking with a commander.

2730. If the engineers over 40 years of age were allowed to retire on their maximum retirement of £130 a-year with the rank of chief engineer, do you think that any of them would accept it?—Yes I think that a number would.

2731. Have you ever been shipmate with engine-room artificers?—No; the only thing that I have had to do with engine-room artificers has been with regard to their qualifications for service. I was employed recently in the office of the chief inspector of machinery.

2732. Have you heard any engineer students making remarks about their position in the dockyard; whether they would like any alteration?—Yes; but I think the alterations required are entirely local, and could be remedied by their superiors in the place. I know of other difficulties. Their training, in my opinion, is bad.

2733. In what way?—Their practical workmanship is not encouraged: all their prizes and inducements are for theoretical studies, and consequently the practical studies are neglected to a very great extent. I think, if a certain number of marks (rather a large number it should be) were given to practical attainments at the periodical examinations, it would further their studies in practical work to a very great extent, and be only just to them. I know, when I was at college, that for certain subjects there were perhaps 300 marks as the maximum, and for other subjects only 100; and I took care to read up that subject which gave me the largest and highest number. Therefore I should say, put the marks very high for practical attainments, as they are so positively necessary.

2734. There is a certain standard of practical knowledge required before a man can be admitted into the service, is there not?—Yes.

2735. Are you aware of the change in the system of their practical training during the last two years?—No, I am not.

2736. You have not seen the circular?—No. I speak more of my own experience. I was an engineer boy myself before the title was altered to "student." I joined the service in February, 1863, and the title was altered in October, 1863.

2737. Did you attend the school?—Yes.

2738. Very much less than is the case now, I suppose?—Yes, it was voluntary.

2739. Where did you obtain your elementary education?—At Greenwich school in the olden times; the upper school.

2740. From there you went as an engineer boy?—Yes.

2741. Was there a competitive examination for engineer boys in those days?—Yes; I passed second of 40. At that time Mr. Riddle was the head master at Greenwich school, and he told me I had made a mistake, which I have since found out to be the case. My schoolfellows are now paymasters, staff commanders, and first lieutenants, while I am still only an engineer with six years' seniority. That is the mistake I made.

2742. (*Captain Commerell.*) Have you ever had any experience of the engine-room artificers?—No; my experience of them is with regard to their qualifications for entry, that is in the office of the chief inspector of machinery. There is one fact which I think it worth while to mention, namely, that on one occasion two very likely men came up, and said that they were fitters from the dockyard, and made inquiries and wanted their name put down. I said that they would be paid 5s. a-day for seven days in the week, and would rise to 5s. 9d. Is that all, they said, we are getting 6s. a-day now, and they went away. I think the same afternoon, or the next day, another man came to me and wanted his name put down, I asked him his trade, and he said that he was a blacksmith. I then said, "What wages are you getting now," and he replied 24s. a-week; he was only too ready to join, but he was found after a very small examination to be totally useless.

2743. (*Captain Dowell.*) Do not you think that those men after serving 10 years will re-enter for another 10 years?—Certainly not, as they are at present.

2744. What in your opinion ought their pay to be?—It ought to be increased and progressive.

2745. To what?—To that of the junior engineers, 7s. 6d. a-day.

2746. (*Captain Commerell.*) At once?—After 10 years' service.

2747. (*Captain Dowell.*) What should they begin at?—At a trifle more than it is now, say 5s. 6d. a-day.

2748. Do you think that the rank which they hold is any inducement for them to enter the service?—I do not think so.

2749. Do not you think that if they had a higher rank it would be an inducement?—I do not think that rank has any effect upon them.

2750. (*Captain Commerell.*) Do you consider that if the engineers were put on the same footing as the rest of the different classes of officers in the service, as regards pay and retirement, that they would be satisfied, of course taking into consideration the age at which the different ranks attain promotion?—I think so, if the chief engineer were promoted earlier.

2751. Are you an advocate for doing away, under certain circumstances, with the engineers' mess?—Yes, most certainly. I think that the engineers' mess is very often the cause of the turning of a well conducted and very able officer into an intemperate man, on account of his utter seclusion.

2752. Why should that be so?—Because he is totally secluded. He is entirely left to himself, with his own thoughts and reflections, and is perhaps suffering from the effects of different climates. An engineer suffers particularly in that respect, and is shut out from all society; he has no society of his own, because small ships only carry two engineers, probably one is in the ward-room, and the other has to mess by himself. In another case, if there be three engineers, one would be messing in the ward-room, and the other two together. Those two are thrown entirely upon their own resources, and if they happen to be of different dispositions, unpleasant consequences follow.

2753. Taking the whole of the engineers, as a body, do you consider that it would be desirable to do away with the engineers' mess at once?—Yes, in small ships, and in large ships, no. The number of engineers in large ships, as they stand at present, is too large. In small ships it has been tried, and has worked very successfully, so far as I know from my correspondence.

2754. You are no doubt aware that there are a great many of the young engineers who are married; a greater number than in any other class?—Yes.

2755. Do you think that they would be able to enter the ward or gun-room messes where the expenses would be much greater than in their own mess, and still be able to support their families satisfactorily?—Not on their present rate of pay. That early marriage, I think, is purely owing to their social connection, and if you improve that you will stop the early marriages to a very great extent. It is one of the faults of their early connections.

2756. The engineer students are very often the sons of the artificers and laborers in the dockyard?—Yes; the engineer student, as such, in many instances quite ignores his own friends and relations and his own home, and he seeks another and gets a wife; but she unfortunately is, as a rule, from similar connections, and so he blindly increases the circle.

2757. I think you said that the engineer service was not popular?—Yes.

2758. What is there in the service now different to what you were led to expect would be the case when you first entered it?—When I entered the service, engineers were promoted to the rank of chief after from 10 to 12 years' service. In the "Himalaya" the senior engineer was promoted to chief engineer after about 6 years; that would be after about 11 or 12 years in the service, and I expected the same thing. Now, I am nearly 13 years, and I have gained one year, which I consider might be counted 14 years, and I am 330 down the list now. I am not only looking upon it in the way of emolument, but I am looking at it as regards duty on board ship, and I consider that my seniority entitles me to something better than that which I had to do when I first joined the service. Still as the list now stands it cannot be avoided.

2759. Do you think it would be an advantage to appoint chief engineers to smaller ships?—Most certainly, and only just.

2760. (*The Chairman.*) And in so doing to increase the list of chief engineers?—Yes; I think it has been reduced by taking chief engineers out of small vessels, consequent upon the altered relation between nominal and actual horse-power; therefore, as an act of justice, I think they ought to be put on again. There was quite as much employment when that list was 240 as there is now, and I think a less number on half-pay.

2761. Is not another reason that we have very much reduced the number of ships in commission of late years?—I think not. In 1869 there were, speaking from memory, about 70 chief engineers more on the list than there is now; that list stands as it did in 1870, at 170.

Mr. G. J.
Weeks, R.N.
26 Oct., 1875.

(*The witness withdrew.*)

WILLIAM GEORGE HILLS BATEMAN, Engine-room Artificer, called and examined.

W. G. H. Bateman.
26 Oct., 1875.

2762. (*The Chairman.*) Are you an engine-room artificer?—Yes.

2763. Where are you serving now?—In the steam reserve workshop.

2764. Not in the floating factory?—No.

2765. How long have you been in the service?—A little over 10 years. I joined in 1864. I have been an engine-room artificer since 1868.

2766. What were you before that?—Chief stoker.

2767. Were you ever a stoker mechanic?—Yes.

2768. Of what trade?—A fitter and turner.

2769. Where did you learn that?—At the London and North Western Railway.

2770. By "turner" do you mean a turner in brass?—In brass or iron, or any thing you like.

2771. How long were you learning your trade?—About six years altogether.

2772. When did you join the service?—In 1864.

2773. As what?—As a fitter and turner.

2774. What was your first rating?—Chief stoker.

2775. What age were you then?—28.

2776. What pay did you get as a chief stoker?—4s. 6d. a-day.

2777. Did you come direct from the railway into the navy?—I came from Sheerness dockyard.

2778. How long had you been there?—Four years and a half.

2779. As what?—As a fitter and turner.

2780. What pay did you get there?—5s. 8d. a-day; 34s. a-week.

2781. Did you serve the railway company after you had completed your time?—I left there and went to Enfield.

2782. What did you get there?—I got 30s. a week.

2783. What were you there?—A fitter and turner.

2784. That was at the small arms factory?—Yes; I only worked a fortnight on 30s., and then I got 34s. a-week.

2785. What induced you to leave Sheerness dockyard to go to sea as a chief stoker?—Family affairs caused me to leave.

2786. Are you a married man?—Yes.

2787. Did you go to sea as a chief stoker?—Yes, in the "Achilles."

2788. Have you ever been to sea as an engine-room artificer?—Yes, in the "Caledonia," in the Mediterranean; and in the "Victor Emanuel."

2789. Did you go out to Ashanti?—Yes; I was doing duty in the pinnaces the whole time.

2790. Did you ever keep watch in the engine-room?—Yes, in the "Achilles."

2791. At sea?—Yes.

2792. Did you get a certificate as to your capability of taking charge?—Yes; from Mr. McKie.

2793. (*Captain Commerell.*) Were you in charge of the stokehold?—No; in the engine-room.

2794. (*The Chairman.*) Did you do the duty of starting and stopping the engine?—Yes; it wanted two. One engineer could not stop them, because the distance apart was too great.

2795. There was one engineer at one engine, and one at the other?—Yes.

2796. Did you obtain that certificate after keeping watch in the engine-room of the "Achilles"?—After the ship was paid off I got that certificate.

2797. You kept watch in the engine-room before you received that certificate?—Yes.

2798. What pay do you receive now?—5s. 9d. a-day.

2799. Are you permanently appointed to the Steam Reserve, or are you available for sea service?—I cannot answer that question positively, but I believe I am likely to remain in the dockyard for some time.

2800. Will your time as chief stoker count for continuous service?—No. The time I take on for con-

tinuous service is dated back twelve months after the time I entered; it is dated back twelve months after my entry as chief stoker.

2801. When shall you complete your ten years' service?—I have completed it this year.

2802. Have you re-entered the service?—Yes.

2803. Do you know of any other engine-room artificer who has re-entered?—Yes. Wade is about to re-enter; his time is just up.

2804. Where is he?—In the "Volcano."

2805. What is his trade?—He is a fitter.

2806. How many engine-room artificers are there working with you?—Eleven.

2807. What trades are they?—There are three fitters, and the remainder are blacksmiths and boiler-makers.

2808. Do you look upon the blacksmiths as a trade of equal value to that of the fitter; would a blacksmith earn as much money as a fitter?—As a rule, a good blacksmith in the factory would get as much as a good fitter, but there are not so many fires in a large factory that they would keep first class smiths to pay them at the rate of 6s. a-day; so that a blacksmith would not get quite so much money as a fitter would.

2809. Supposing you returned to a ship aloft, would you think a blacksmith in the engine-room was of the same value as a fitter?—I am a fitter. I would rather say no to that, but it is hardly quite fair to ask me that question.

2810. Is a blacksmith always at work at his own trade during his service in the engine-room?—Yes.

2811. At forge work?—Yes, as a rule he is. There is a lot of boiler-maker's work to be done, and consequently he has to turn to that.

2812. Then the blacksmith would be a boiler-maker?—Yes, and myself too.

2813. Do you find that a boiler-maker becomes a fitter at all, or can he help at fitting work?—I have never found many of them do that.

2814. Do you think that the engine-room artificers whom you find in the service are, as a rule, good men and know their work well?—Yes; but of course there are exceptions to the rule.

2815. Take the average; out of every ten, how many useless ones are there, do you think, who do not earn their pay?—There are some that are really not worth their pay; but it is not the men's fault, it is the fault of the pay they give in the service. I must say that there are some that are really not fit to hold the rating of artificers.

2816. They have not been properly examined when they entered the service, I suppose?—I cannot say that; but they prove themselves inefficient when they get there.

2817. Have you any suggestions to give to the Committee with regard to any improvement which you think would be desirable in the position of the engine-room artificers, whether as regards their pay or treatment or position on board ship?—You would get a far better class of men in the service as regards mechanics, and there would be plenty willing to join provided they could get better pay.

2818. From where?—From the dockyards.

2819. And also from the private trade, do you think?—Yes, and likewise from the private trade.

2820. What could you earn in the private trade now?—I could command 6s. a-day to start with.

2821. But that is only for six days in the week?—Yes; but I am at home, and I have the pleasure of my evenings and my Sundays without work.

2822. Are you not at home now on Sundays?—That is not always the case; it is only a treat for me to be on a short duration at home.

2823. Do you think that a spell in the steam

reserve is looked upon as a privilege by the men?—I consider it so.

2824. How long have you been there?—About twelve months, as near as possible.

2825. Have you any suggestions to offer to the Committee as to any improvement in the position and treatment on board ship of engine-room artificers?—Yes; there is the messing, and also the uniform. The uniform which is worn at the present time is not sufficient to keep one warm, even on a day like this; an engine-room artificer is not allowed to wear anything in the shape of a covering for himself unless it is an oilskin, and that gets damaged in a moment, and is not fit to put on at the mustering.

2826. Have you no pea-jacket?—Yes, but the captain can tell us to take it off.

2827. What sort of a jacket is it?—A short reefer or monkey jacket.

2828. With uniform buttons on it?—Yes.

2829. Is that your strict uniform?—Yes.

2830. What other class is allowed to wear it?—The master-at-arms, but he has a larger one.

2831. What would the artificers wish as regards their messing?—A mess by themselves, apart from the stokers that we are generally in charge of and in connection with; a mess away from the stokers and ship's company.

2832. You would not wish to mess with the chief petty officers on board ship?—Not at all.

2833. Why not?—Because we cannot do the same as they do in the way of cleaning the mess, and taking turns as cook, and so on.

2834. Would you like to mess with the master-at-arms?—According to the service regulations, that is where we should mess, but we would rather have a mess to ourselves.

2835. Where, in the engine-room flat or anywhere near the engine-room?—In any part where it was convenient for the captain to put us.

2836. How about cleaning the mess?—We wish to have somebody to look after that. In many instances there has been a boy told off for that duty. Many a time I have come out of the engine-room with not a fit uniform on, as I have been working hard down below all the time.

2837. How many chief stokers are there in a ship now?—That was abolished before the present rating of engine-room artificers was established.

2838. But there are stoker mechanics in a ship?—Not at that time, that I am aware of; in the "Caledonia" there were no stoker mechanics.

2839. Would you like the stoker mechanics to form a mess with you?—No; you might as well mess with the stokers at once.

2840. The stoker mechanics come from the factories a good deal, do not they?—The stoker mechanics are those in the reserve; they come there as mechanics, or rather as stokers, and pick up different trades, such as handy men; they would be boiler-makers.

2841. As a rule, they have not served their time at a trade?—No, not all. They pick up a little knowledge of the different trades, and they pass for three-pence a-day.

2842. Have you had any experience of the blacksmiths in a ship?—No.

2843. Have you seen that work at all?—Yes.

2844. Supposing they felt themselves fitted to become engine-room artificers, would they be received as engine-room artificers?—Yes. If they put in as candidates for engine-room artificers they would be allowed to enter.

2845. Why do not they, they would get much better pay?—A great many are allowed to, and those who have tried have not got in.

2846. You mean to say that you do not think they would pass?—Yes, that is so.

2847. Do you think that an engine-room artificer should have his pay raised after he has been 10 years in the service?—I should think so.

2848. Do you think that the engine-room artificers

would consider it a boon if they, after a certain service at sea, were allowed to join the dockyard, to work in the factories, on the pay they had then earned, but were required to go to sea at any time if emergency necessitated it?—Yes. I believe they would be perfectly willing to do that.

2849. Do all engine-room artificers get a turn in the steam reserve after certain periods of service at sea, and if so, about what length of time do they remain?—That lies a great deal with the inspector. If a man is a valuable man to him, he endeavours to keep him as long as he can; and if not, he will endeavour to get rid of him as soon as he can.

2850. So that a spell in the steam reserve is looked upon as a reward for good men?—Yes.

2851. It is something to be looked forward to?—Yes.

2852. What pension shall you get at the end of 10 years?—The same as a first-class petty officer. The highest I could get would be £52 a-year, the same as a first-class petty officer.

2853. Did you ever belong to a trades-union?—Yes.

2854. Do you now?—No.

2855. Why not?—I left it some few months ago, when I was in Malta, when I was in the "Caledonia."

2856. Does not the government do everything for you that the trades-union could do?—It does not provide anything for my family in the event of anything happening to me.

2857. They provide for you when out of work, and in sickness, and in old age; but they do not provide for your family in case of your being killed or dying in the service?—No, they do not.

2858. That is the only thing that trades-unions will do for you that government will not?—The trades-union will give you a donation if out of work.

2859. Does not the government take care that you are not out of work?—Yes, when in the service you are not out of work.

2860. The only thing trades-unions will do for you, which government does not, is to provide for your family, or give them a donation if you are killed?—They likewise pension you, too, after you have been a certain time in the trades-union.

2861. What have you to pay your trades-unions?—1s. a week, 4s. a month.

2862. Do you insure your life?—No.

2863. Do you like a sea life?—I have no objection to it.

2864. Did you find any inconvenience with regard to your chest when in the "Caledonia"?—I have always been allowed a large size ever since I have been at sea. I bought a small one in the event of my not being able to have the large one.

2865. Are you a married man?—Yes.

2866. Do you live here?—Yes.

2867. Where do the single men live who are in the Steam Reserve, have they got ship accommodation?—No, those in the steam reserve live on shore.

2868. Are you allowed lodging money?—Only 7s. 7d. per week, 1s. 1d. per day.

2869. (*Captain Dowell.*) Do not you get rations?—We have nothing more; that 7s. 7d. is to provide us with lodgings, and provisions, and fuel, and everything; there are several boats crews that are getting 1s. 6d. a-day.

2870. (*Captain Commerell.*) What is the size of your chest?—The big chest is 84 inches long by 2 feet by 2 feet.

2871. (*The Chairman.*) Have you anything further to suggest with regard to any improvement in the position of engine-room artificers?—No, I think not.

2872. What pay do you think they ought to receive at the end of ten years' service?—I should think from 8s. to 8s. 6d. per day would get good men. There are great inducements held out to men. After a man has been to sea once, he finds out that he can get a tremendous lot more than he can on board; he has opportunities offered to him, and offers are thrown out to him to take good appointments elsewhere.

2873. Would you not think it desirable that the rate

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of pay should be progressive, rather than by a jump, an increase every three years until a certain maximum was reached?—I do not think that you will ever get men from either the dockyards or the private firms to enter the service unless they get a better start; that is the main thing which they look at.

2874. When you say "men," you mean really good men?—Yes. I mean good men, that will pass an examination anywhere.

2875. (*Captain Dowell.*) How did you manage in the ships in which you have been to sea about your hammock?—I had to do it myself, or to pay a man to do it for me.

2876. What is the general custom?—I paid a man a shilling a-week to look after mine, 4s. a-month.

2877. Do you know what the pay of a boilermaker in the merchant service would be?—I do not.

2878. Would it answer for your mess if you had a stoker appointed to it who should mess with you and clean the mess out, and do that sort of thing?—It would not be a recognised thing; in many ships they would take that stoker away for the duties below, and the mess would remain as it was, and it would not relieve us from the commanding officer finding fault; it would not answer unless a person was told off for that duty.

2879. Have you ever been in a ship where a stoker has been excused for that duty by the chief engineer, and has been allowed to mess with the engine-room artificers?—No, never.

2880. In the ships you have been in at sea how did you obtain your leave when you wanted to go on shore?—By going to the master-at-arms, in other ships by going to the commanding officer and having leave, having previously been to the chief engineer to ask his permission.

2881. Have you ever found any difficulty in obtaining leave?—Yes, through having to wait until the men had fallen in and been mustered. In the "Achilles" I had to fall in and be mustered like the other men, and wait until my turn came to go over the side.

2882. Was that the same with all the chief petty officers?—Yes, with all the chief petty officers.

2883. (*Captain Commerell.*) Do you know what leave the chief petty officers had in the "Caledonia"? How often could they go on shore?—I think one chief petty officer had to remain on board every night; but all the others could go on shore.

2884. And provided you got the leave of the chief engineer you could do the same?—Yes, one only had to remain always on board.

2885. How many of you were there?—Three.

2886. So that you could go on shore two nights out of the three?—Yes.

2887. Did you mess with the master-at-arms in the "Caledonia"?—In the first part of the commission we messed with the chief petty officers and afterwards the commander gave us a mess to ourselves.

2888. Did you find it disagreeable to mess with the chief petty officers?—Yes, rather.

2889. Did you afterwards mess with the executive or civil branch?—With the executive branch.

2890. Where do the civil petty officers mess?—The writer, the ships steward, and the master-at-arms messed together.

2891. Would you have preferred messing with them or with the executive?—With the master-at-arms, the non-executive branch.

2892. We have found that artificers prefer messing with the master at arms?—Yes, because the master-at-arms has it always in his power to tell some one to scrub his mess and look after it, and if we messed with him we should never be brought into trouble through our mess not being clean; that is the reason the engine-room artificers would prefer to mess with the master-at-arms.

2893. (*The Chairman.*) Which do you find to be the pleasanter companions?—I should prefer the companionship of the master-at-arms to that of the

executive chief petty officers, although I have found many chief petty officers far superior to myself in education and manners too.

2894. Do you think that the position of the engine-room artificers could be modified if they were placed entirely under the chief engineer instead of having anything to do with the master-at-arms?—Yes, most certainly.

2895. (*Captain Commerell.*) Do you attach much importance, as an engine-room artificer, to your relative rank as a chief petty officer, or what advantage do you think you gain by having that relative rank?—I consider that if we hold the rank we do at present we are under the master-at-arms, and the consequence is that he orders us about the same as other persons; if placed upon an equality with him he would not be able to do so, or even if we were placed next above him on entering the service as mechanics; we should gain more respect by that I think.

2896. Is it not the case that you would sooner be left alone than have any rank at all?—The master-at-arms' duty is to look after everybody, but at the same time we do not want the master-at-arms to come and tell us that he is our superior officer, which of course, according to the navy list, he is, and he likes other people to know it.

2897. (*The Chairman.*) Is he not superior to the chief gunner's mate?—He is next above the chief gunner's mate.

2898. (*Captain Dowell.*) Do not you think, supposing you were made senior to him as an executive officer, you would be obliged in a measure to obey him, even supposing you were his senior?—Most decidedly, we should as regards his police duties; but he would not be able to interfere with us in any other way.

2899. (*The Chairman.*) Have you ever served in an iron ship with compartments?—Yes; the "Achilles" was an iron ship with compartments.

2900. Where did you mess in the "Achilles"?—Right forward, on the port side.

2901. Of the lower deck?—Of the main deck; there was no lower deck, it was the gun deck right forward on the port side.

2902. Did any one at all mess in the engine-room flat?—No.

2903. Was there any place in the engine-room flat where you might have had a comfortable mess to yourselves?—There was a place in which a mess could be made, but it was filled up with marines' bags.

2904. Supposing those bags had been removed, and a piece had been partitioned off for you, would that have made a comfortable mess-place for you?—Yes.

2905. Would you prefer that to any other position in the ship?—Yes; if we had got it to ourselves and could depend upon coming up and finding our meals all right.

2906. (*Captain Commerell.*) Which would you rather have, to be entirely under the engine-room staff, and under the immediate orders of the chief engineer, or to be as you are now, on the lower deck in the chief petty officers' mess?—We would prefer being directly under the chief engineer's orders, and having nothing to do at all with the other chief petty officers.

2907. Do you think that would be the general feeling of the engine-room artificers?—It would be, I believe; I have reason to think so.

2908. So as to be entirely separate from the lower deck?—Yes.

2909. (*The Chairman.*) You said that you would like an improvement in your uniform, what sort of dress would you like to have?—Something warmer than this jacket, something that would take this shell-jacket away.

2910. Something in the shape of a tunic, or well made pea-jacket, or do you mean a frock-coat?—The schoolmaster, and writer, and the master-at-

arms all wear a frock-coat; and we wear the same uniform with the exception of that. I do not think

it is too much to ask for the same uniform as they have got; the writers have a frock-coat.

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(The witness withdrew.)

Adjourned to to-morrow, 12 o'clock.

WEDNESDAY, 27TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.
CAPTAIN WM. M. DOWELL, R.N., C.B.
CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., C.C.
JAMES WRIGHT, Esq.
WILLIAM NATHANIEL COVEY, Esq. R.N.

G. FINLAISON, Esq., Secretary.

WILLIAM HENRY STEIL, Esq., R.N., called and examined.

2911. (*The Chairman.*) What office do you now fill?—That of chief engineer at Portsmouth dockyard.

2912. How long have you held that appointment?—Since the 1st of April last.

2913. What appointment did you hold before that?—I was senior assistant to the master shipwright and engineer at Portsmouth dockyard, and held that appointment for two years and a half.

2914. Where were you previous to that?—At Sheerness, as engineer of the dockyard, and previous to that I was assistant inspector of machinery at Portsmouth dockyard.

2915. Not in the steam reserve but in the yard?—Yes, in the yard.

2916. How many years' service altogether have you had in the dockyard?—Eight years, since the 12th of October, 1867.

2917. How many years' service had you as chief engineer afloat, or as engineer in charge?—As chief engineer, from August 1861 until 1867.

2918. Had you at Sheerness dockyard, or have you in Portsmouth dockyard, any special charge of the engineer students in the yard?—Yes, in Portsmouth, Sheerness, and then at Portsmouth again; at all places.

2919. Is there at this dockyard any officer under you who has special charge of the engineer students now?—The second assistant to the chief engineer has special charge of them, in the way of examining them and so on; that is Mr. Durston. In addition to him there is a leading man set apart specially to superintend their work, and to see that they are properly employed.

2920. Do they work in the same shops all their time?—No.

2921. How is their work divided?—It is split up into fractions or portions of their time.

2922. Of what time?—Of their six years. I can give you in detail the routine. For the first three years they are employed in the fitting shop; in the fourth year they have three months in the copper-smith's shop; three months in the foundries, iron or brass; three months in the boiler shop; and three months in the smithery. In the fifth year they are employed in the erecting shop, for six months and on the hulls of iron ships six months; in their sixth year they are employed on ships afloat, in the repairs, &c., and, if allowed, they have three months in the drawing office.

2923. You have not mentioned any drawing office work in the fourth year, I think?—No, not as a rule.

(*Mr. Wright.*) They are taught drawing in the evenings.

2924. (*The Chairman.*) What style of work do they do during the six months they are employed on iron shipbuilding?—That I am scarcely in a position to answer, because the iron shipbuilding is in no way connected with me; they are handed over or left to the directions of the chief constructor.

2925. During that six months of their time at iron shipbuilding, is there a leading man instructing them?—I believe so.

2926. I suppose, when removed from you, your leading man has nothing whatever to do with them?—Nothing whatever.

2927. Have you any idea what number of engineer students, all told, you have in the dockyard now?—Speaking from memory, I should say about 59; we have recently had a number transferred from the factory to the Royal Navy.

2928. Is an account kept of the work which they do in the shops, or does it all go to the general account of the work done?—An account is kept in the shops.

2929. From your experience of them, do you consider that they earn their pay in the shops?—Yes, for the time which they are employed, that is taking their last year of service, when they have gained skill as artisans; for the first two or three years they are simply learning.

2930. Are you satisfied with the practical training which they receive during the six years that they are employed in the dockyard?—Yes.

2931. You think that their six years are as profitably spent as they well could be, and you see no way of improving it?—No; of course they do not get the same description of work that they would get in a private firm.

2932. Why not?—Ours are chiefly repairs; in a private firm they would have new work.

2933. Do not you think that working on repairs prepares them for the work to be done hereafter as well as new work would?—If they join the navy it is better for them, as there they would only have to do repairs.

2934. But other work you think would extend their knowledge to a certain extent?—Yes.

2935. Could you suggest to the Committee any improvement in the treatment of the engineer students while they are going through their course of training in the dockyard, or any modification which you consider might be advantageous?—I have studied this matter well, and I think that everything which could be done is done now.

2936. Do you think that the system of admitting

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engineer students without selection, or without nomination rather, as at present, is a good system?—No, decidedly bad.

2937. What would you suggest as an improvement upon it?—I would propose that for the first four or five years of their apprenticeship they should receive no pay whatever, and that they should be maintained by their parents.

2938. What object have you in that?—If I may go somewhat out of the subject, I may say that for the last two years they should serve afloat, and then for the first time they should receive wages; the object in so doing would be to exclude the sons of certain people whose sons are now admitted. I think the money question would do that.

2939. Do not you think that the object might be gained more directly if the Board of Admiralty were to nominate the candidates, as is the case with the other various branches of the service?—Yes, I think so.

2940. If that were the case, and the Admiralty were to limit their nominations to those whom they thought suitable for the service, do not you think it would be rather hard to give the sons of officers and others in the service, work to do without paying them for it, if they could avoid it?—Yes, if they could avoid it. I have never heard that mooted; the reply to the previous question is simply a proposition of my own.

2941. Your object is to raise the social status of the engineer students?—Yes, that they may be qualified to take their position as officers hereafter.

2942. If that be actually effected, by the Admiralty giving nominations, should you think it advisable to make any change in the treatment of the engineer students during their six years in the dockyard?—I think there may be little points in which improvements might be made.

2943. Supposing the engineer students were reduced very many in number, and their social position raised, do you think it would be advantageous to have a mess place in the dockyard for them, where they could reside and mess?—Yes, to maintain them in a college, you mean.

2944. Something of that stamp, so that they could reside and mess in the dockyard?—Yes, I should say so.

2945. You think if that could be managed it would be very desirable?—Yes.

2946. Do you take part in the examination of the engineer students when they have completed their course?—Yes, and I sign their certificates.

2947. Who acts in conjunction with you?—The captain of the steam reserve and the chief inspector of machinery afloat.

2948. What percentage or proportion of the men do you find disqualified in their practical work at the end of their six years training, or do you find any?—Oh yes, occasionally, but very seldom.

2949. Did you find any this last year?—I think not; but in order to prevent what has been complained of, namely, that the students of late years have not been quite up to their work as regards their mechanical knowledge as workmen, it has been my custom to submit their names to the captain of the steam reserve, who gives them a test job in the steam reserve workshop, under the supervision of the chief inspector of machinery afloat, and away entirely from the factory workmen, and on the result of that work the man is pronounced fit as a mechanic, or unfit for the navy; if unfit, he returns to the factory, but we have had no case of that. Note is taken of how long he takes to do the work also; we find it is quite necessary to do that, as there were complaints of their not being able to do their work.

2950. Does that examination take place only when the man is finally leaving the dockyard?—When his time for work in the factory has expired, and he is about to join the navy.

2951. There are no annual examinations of the engineer students in practical work?—We have that

every day; not exactly examinations, but we see their work. There is no examination of that kind in the steam reserve.

2952. Are you aware of the examinations of engineer students which are conducted every year in practical engineering?—Yes, I know that.

2953. Do you think it would be advisable, or any inducement to these young students, if marks were given for their practical work in the dockyard, in addition to the marks given for practical engineering?—I should think it would be a stimulus to them to work and to gain proficiency in their profession, and it would create a spirit of emulation amongst themselves.

2954. Do you think that the regulation of May 1873, regarding the practical work in the dockyard, has had a good effect upon the engineer students. You will remember that a leading man was then first appointed to superintend them; and they were then to be examined by the inspector of machinery as well as by the dockyard officers?—It has had a good effect, no doubt; in fact, the tone of the students has improved since that time.

2955. Have you had any experience of the engine-room artificers in the navy after they have entered for the navy?—Very little; in fact, none I may say.

2956. Have you had anything to do with the examination of engine-room artificers for entry into the navy?—Oh, yes.

2957. Have you any record at this dockyard of the number of applicants and the number of failures, or any history of them at all?—No; that would come from the steam reserve, as the application is made there.

2958. All you do is to examine and report?—To be present at the examination; as a rule they come from the factories.

2959. Does a large proportion come from the factory?—Yes.

2960. When a man volunteers from the factory, do you report upon him from a knowledge of his capabilities, or do you have a special examination?—We report to the steam reserve upon his ability as a workman, and, if fit, there is an examination as to his theoretical knowledge.

2961. As regards his practical knowledge, of that you are aware?—Yes; in the event of a stranger making application to the steam reserve, and his ability not being known, he is sent to the factory and is tried in the shop according to whether he be a coppersmith, smith, foundryman or boilermaker.

2962. What description of examination in the shop would you give a stranger?—We should very soon see whether he was a mechanic or not.

2963. Is it done in a day?—Yes, we can easily see whether he is a man accustomed to his tools by the way in which he goes about his work; many have been rejected. During the time he is doing his job he is under the immediate eye of the leading man of that shop in which he is employed.

2964. As a rule do you think that the engine-room artificers, who have entered the service are thoroughly satisfactory?—They might be better.

2965. In which trade do you think we get the best men; are the fitters better fitters, or the boilermakers better boilermakers, or the coppersmiths better coppersmiths than the others, or in which trade do you find the deficiency if there be any?—We have had men calling themselves smiths and fitters, but when they have been tried they have failed.

2966. By "smith," you mean blacksmith, I presume?—Yes, or boilersmith.

2967. Do you consider that a blacksmith is of equal value to the navy in the engine-room as a fitter?—No, I do not, for the simple reason that there is always a blacksmith on board a ship, and there is not always a fitter.

2968. When stokers or stoker mechanics have offered themselves for examination, what trade have they generally been?—Various trades, moulders, smiths, and fitters, but most of them have never

served their time or any apprenticeship; they have only a smattering of the business they profess.

2969. Some have been able to pass?—Oh yes, it is not an unusual thing for an amouner to present himself who has a fair knowledge of his business, the chances are that he will have a very much better knowledge than a moulder.

2970. Are moulders entered as engine-room artificers?—They never present themselves, as the inducement is not sufficiently good; moulders are in receipt of a high rate of pay on shore. If I may be allowed to suggest it, I would strongly recommend that the engine-room artificers should be brought up in the dockyard; at the present time we are teaching what are understood to be trade boys, we make them thorough mechanics, and immediately they are out of their time they leave us.

2971. Why do not they enter as engine-room artificers?—Because I do not think that the inducement is sufficiently good.

2972. What pay on first entry do you think would be an inducement for those men to come?—Of course they would get their provisions in addition. Those young men would not be married, I think; the pay before they are out of their time would not be sufficient to maintain a family. I should think from 5s. to 6s. a-day.

2973. They now get 5s.?—Not till out of their time.

2974. What pay would induce them to enter as engine-room artificers?—If you were going to accept those boys as engine-room artificers, I think from 5s. to 6s. a day; and they ought to be put under a bond also.

2975. You would recommend that the boys should be apprenticed?—In the same way as shown by this form (*Form H. 485, see Appendix*). They should be trade boys or factory boys.

2976. Can trade or factory boys be bound unless apprenticed; at present we educate these boys, but they do not come into the service; how are we to make them come; is it better to bind them to come, or to give them an inducement to come?—I do not know where you are going to end with your inducements. The only thing is to have a hard and fast line, the same as you have here in this form.

2977. But it is a question of demand and supply. We shall not get boys to volunteer for the position of engine-room artificers unless we make it such as they would accept?—Yes, quite so; but they do not know of anything of this sort. This is simply a thought of my own; they are not even aware of it.

2978. Could you keep them unless they are bound as apprentices?—I do not think so. Inducement is a fallacy altogether, in my opinion.

2979. We want engine-room artificers, and the boys who are brought up in the service will not come to us for 5s. The question is, what will they come for?—It is not a money question.

2980. What sort of a question is it, then?—A question of the treatment which they receive on board ship.

2981. What alteration would you suggest?—When the engine-room artificer's rating was first established, there was no lack of applicants; we were inundated with them at Sheerness.

2982. (*Captain Dowell*.) There is no lack of applicants now, I understand. Do you find otherwise?—That is a question I am unable to answer.

2983. (*The Chairman*.) Do not you think it is desirable to get them from the private trade as well as from our own factories, if possible?—Yes.

2984. Would not it enable you to have a power of expansion in time of war if the benefits of being in the service were known amongst the private factories?—My opinion is, that in private firms the men have never been trained to discipline, and there would be great difficulty in breaking them in to the customs of the service. Our own lads, who are brought up for artificers, intuitively drop into the ways of the service, because there is no doubt that we are much more strict in government establishments than they are in private firms.

2985. You have referred to the treatment of the engine-room artificers afloat. What points do you consider might be altered with advantage?—I can only speak from the information I have received, therefore I would prefer you getting that from a naval man. I have had no experience of engine-room artificers afloat.

2986. Do you think that if we wish to retain the engine-room artificers in the service after the expiration of their ten years, their pay must be progressively increased?—Yes.

2987. Up to what maximum?—To about 8s. a-day. Money value is always altering, and if it alters in the future as much as it has done during these last 20 years, that pay would have to be increased.

2988. What pay do the men now get as fitters or boilermakers in the dockyard; between what limits?—From 5s. to about 8s. a-day.

2989. Are there none paid less than 5s. a-day?—Oh, yes, from 3s. 6d.; we may say indeed that we go from 2s. 6d. a-day in the boiler shop.

2990. Those would be labourers, I suppose?—Skilled labourers, but not the style of men that you would enter in the service as engine-room artificers.

2991. Do you think that a man who is receiving 5s. a-day in the boiler shop would be suitable for the navy as a boilermaker; would you be able to recommend him, do you think; you might say that 5s. a-day represents certain qualifications?—Not the whole of them.

2992. Are their wages in the boiler shop raised as recommended by the officers, or according to certain numbers on each scale of pay?—As recommended by the officers.

2993. There is no limit to the number of them who receive 6s., 7s., or 8s. a-day?—Not if their ability deserves that sum as their daily wage.

2994. Are any of the men employed in the factory entitled to pension?—No, none whatever.

2995. Are they all hired men?—Yes, nearly all hired men. In the millwrights' shop, which comes under the head of the factory, some few still remain on the establishment.

2996. Have you ever considered whether it would be desirable to make an establishment for the factory-men?—I think it would be for some portion; that is to say, for the leading men certainly; for this reason, that a labourer and a leading man after 20 years service go out under precisely the same conditions, while one has been receiving 2s. 6d. a-day and the other 9s. a-day.

2997. Do not they get a gratuity on leaving?—Yes, £1 for each year's service after 20 years' service; one has great responsibility and the other has none at all.

2998. (*Captain Commerell*.) They simply get their £20 and go?—Yes. A man who has had the care of machinery and control over 300 or 400 men, *i.e.*, mechanics, and the labourer who pulls a rope about, get the same amount.

2999. (*The Chairman*.) Do you think that the prospect of a pension is a great inducement for men to join the government service, and a guarantee for their good behaviour?—I think it is.

3000. Do you consider that if the engine-room artificers, after a certain period of service afloat, were allowed to go into the dockyard to work at their trades upon their sea pay, with the understanding that they were to go to sea again when emergency should so require, it would be a popular thing with them?—Yes, with them it would, but it would not be with us the employers.

3001. Why not?—Because I am under the impression that these men, knowing that they were quite safe, would just do as little as they possibly could; they would not throw out their best exertions on the yard work, and we should have no control over them, because they belonged to the navy; if a man does not thoroughly exert himself now in the factory, we can give him a week's notice and he is gone.

3002. Do not you think that they might be sent to

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an establishment at the dockyard entirely under your control, the same as the civil servants, the very fact of their having earned a pension might be a pledge for their good behaviour?—No. I would recommend their going to the steam reserve workshop; they do important repairs there, and they could be profitably employed in that position in the steam reserve.

3003. Is it not generally the case that they have as many engine-room artificers in the Steam Reserve waiting employment as they can find work for. I am looking forward to making a large reserve of engine-room artificers in the event of war?—I think if it were understood that the engine-room artificers were to go to the steam reserve workshop, they could then take more important work in hand than they have at present.

3004. Would they not want a larger shop?—I do not know about that; they have a large shop, and they have also a floating workshop; the shop is very big now.

3005. Do you think, then, that if the number of engine-room artificers were largely increased, work should be found for them in the steam reserve when on shore, and that if the workshops were not large enough, they should be made larger?—In the case of Portsmouth, I should think they are quite sufficient; they have demanded a large quantity of new machinery, and they have a powerful engine for driving it. If they were so employed, I should certainly propose that the engineer officers should be taken away from the workshop.

3006. You do not think it is right that they should work side by side with the artificers?—No.

3007. Has it ever occurred to you that it would be desirable to reduce the number of engineers and increase the number of engine-room artificers?—Most decidedly.

3008. What benefit would you expect to derive from that?—It would put the engineers in a better position for one thing; and for another, they would be able to superintend the mechanics in doing mechanical duties which the engineers at present have to do themselves.

3009. Would it, in your opinion, be desirable to do it with a view of inducing a flow of promotion in the engineer ranks, or are you sufficiently acquainted with the state of the engineer list afloat now, to be able to give an opinion upon the subject; at present there are four and a quarter engineers to every chief engineer?—I have not gone into detail, but I know there are about 800 of them, and I see no chance of the last one ever being promoted at the present rate of promotion.

3010. (*Captain Dowell*.) Do you think that if promotion were more rapid there would be any difficulty in obtaining a higher class of candidate for the service?—I do not think there would be any difficulty if you make a superior class of them, and do not draw them from the present sources.

3011. Do you think that the engine-room artificers are equal to the factory men as workmen?—They are factory men; each and every one that has come before me has positively served his time and apprenticeship, and, as a rule, produces his indentures.

3012. Do not you think it would be a benefit both to the factory and to the service, if every factory man were an engine-room artificer?—Then you would be swamped with numbers, if you say "every" factory man.

3013. Then say a large portion, or your best men?—Those best men you speak of, are in receipt of as good a pay now as if they received their maximum rate as engine-room artificers; those we term "platers" would receive, or are actually now in receipt of, as good pay as you would give them as the maximum rate of engine-room artificers, say 8s., and they have the opportunity or the chance of making overtime, which means time and a quarter, or on Sundays, time and a half. These men have short hours, they come in at half-past seven and knock off at quarter-past four o'clock; they work all the year round, summer and winter eight and a half hours each day.

3014. (*Captain Commerell*.) Exclusive of meals?—Yes, that is the actual time worked.

3015. (*Captain Dowell*.) Did you say that you thought it would be advisable to have a mess in the dockyard for the students?—Yes, that they should live in the yard.

3016. You think it would be advisable that they should be more like cadets than engineer students?—Yes; I believe that is the term used in the American service.

3017. (*Captain Commerell*.) Do not you think that if you took away the pay of the engineer students for the first four years it might press hard upon professional men without much means?—My object is to keep the present class of applicants out.

3018. Do not you think that there are many professional men, who are not particularly well off, upon whom that would press rather hardly?—There may be isolated cases, but it would press equally hard upon the lower classes, whose sons are now entered. We find that the sons of naval officers do not get in for this reason to a great extent; the lower classes can send their sons to a board school, where they can receive a better education than the naval officer can afford to give his son.

3019. I am afraid that giving them no wages would keep out a very respectable class of young men?—That, of course could be left to the Admiralty.

3020. (*The Chairman*.) The question of nomination would settle that point without imposing a tax upon them?—Exactly. I may mention to you a case that came under my notice: it was this: at the competition a washerwoman's son passed into the service, while the son of the officer for whom this woman washed was rejected; that was because the washerwoman's son went to a charity school, where he received a better education than the naval officer could afford to give his son.

3021. (*Captain Commerell*.) Could you suggest anything with regard to the engine-room artificers which you think would enable us to get better men than we have in the service at present?—It is the treatment, and not the money, that keeps them out. It is not a money question at all; it all depends upon the commanding officer on board ship in what way the men are employed. I would suggest that they should be put under the engineer department entirely.

3022. Have you seen their mess places on board?—I have not. Why I suggest that they should be put under the chief engineer entirely is, that if you reduce the number of engineers, then the chief engineer is wholly and solely depending upon those mechanics for the detailed examinations which are called for by the Admiralty; and if the men are removed from him for employment on deck, when they have other work to do, or are interfered with in any way, the chief engineer never has an opportunity of making a report. I may mention that I have heard another complaint with regard to the insufficiency of their chest accommodation; the chest is not big enough for them.

3023. (*Mr. Wright*.) It has been suggested that a naval engineer, with the rank of chief engineer or engineer, should be employed to superintend the work of the engineer students, instead of a leading man as at present. Do you think it would be desirable to make that alteration?—No, not without you are going to enter a superior class of men. As things are at present, so they should remain. The leading man now selected for that duty is a highly respectable man, of decent education, and a thorough mechanic; and I am not quite certain that the engineer officer whom you selected would be. I allude only to the officer's practical qualifications.

3024. (*The Chairman*.) In the event of a better class being entered, do you then think it would be desirable?—He should be an engineer of known ability.

3025. (*Mr. Wright*.) And subordinate to the chief engineer of the dockyard?—Yes; you could not have two, you know.

3026. Do you find the engineer students at present sufficiently tractable and amenable to the regulations?—Yes, they are now.

3027. Did you ever have any difficulties with them?—Yes, very great difficulties. I may say that I have had the whole of the difficulty with them, both at Sheerness and here, and the screw had to be put on very tight. By making several examples, we have now toned them down a little.

3028. What sort of difficulties had you?—Idling and skylarking, and not keeping good time; but those are difficulties we have now got over. If a student loses in his five years 31 days, at the expiration of his servitude when he ought to go into the navy, he has to work up those 31 days, which might throw him a year behind, or more, in seniority; so that they are very careful now.

3029. What number of trade and machine boys, exclusive of rivet boys, have you in the factory at the present time?—I can scarcely tell you from memory, because there are supernumerary boys; but I can give you the list.

3030. If you were to train up a large number of them for engine-room artificers, would there be any difficulty in the working of the factory, through having at the same time a number of engineer students, who would mostly be employed on similar work to that which the trade boys had?—I think the number borne in this yard now is quite sufficient, it is 120 now; it is only within the last ten days that I have been in correspondence with the superintendent, to know whether that number should not be reduced. There are 1,552 men employed in the factory proper for the steam branch, and if you take 120 or more trade boys, it makes about a twelfth or thirteenth of the whole number employed. Those boys, as I have already said, learn their trade, and then they immediately leave us to benefit themselves by gaining experience in private firms, and they get more pay than we should give them on first being out of their time.

3031. The boys when they have learnt their trade get employment elsewhere?—As a rule the good ones leave.

3032. When you want men for the factory you get them from the outside, they are not trained in the dockyard?—We have some that we have trained; but as a rule that is the case. Those who do remain are not the first-class men, they are men who have not made the best use of their time.

3033. You still think that if a large number of engine-room artificers were employed, it would be better to employ them in the steam reserve?—Yes.

3034. Do not you think there would be some difficulty in working two establishments on the same kind of work in the same dockyard, the factory proper and the steam reserve workshop?—There has been no difficulty yet.

3035. But the number is small now?—You would remove the engineers and put the engine-room artificers in their place. The engineers should only be employed to supervise the work.

3036. What would be the difficulty in employing engine-room artificers in the factory proper?—I think I have mentioned that they would not be under the dockyard discipline.

3037. Why not; what would be the difficulty in that, they would still be under a naval engineer, because with one exception all the dockyard officers are naval engineers, and if the engine-room artificers did not behave themselves you could discharge them?—That would only be in gross cases of misconduct. I think that they would have a bad effect upon the ordinary workmen. In fact, I think they would clash.

3038. Would it clash any more than if you had a certain number of established factory men, and a certain number of hired factory men?—That is not done yet.

3039. In the shipwright department there are a certain number of hired men, and a certain number of established men. Supposing the engine-room artificers

were to be in the position of established men, what would prevent its working?—You quote now the shipwright department; at the present moment there is a bad feeling existing between the hired men and the established men. The hired man is working at a better rate than the established man who is working alongside him.

3040. But the established man has permanent employment and a pension to look forward to, and the hired men are discharged. Are the hired men very anxious to become established?—Yes, they are; but they do not like to lose their pay.

3041. There would be no difficulty in the same way, supposing the engine-room artificers were employed in the factory and reckoned for their lost time?—They would have to take up tickets again, and I doubt very much whether they would care about that.

3042. They would only be doing what they did before they entered as engine-room artificers?—Wearing the uniform, as they do now, they would not care about elbowing their way through a lot of mechanics, and they would not care about going through the muster office with a lot of dirtily dressed fellows; if you sent them through the muster office they would be subject to the police regulations, because they are nothing more nor less than workmen.

3043. That is really what is desired to be obtained on board ship. Good workmen, who could do the manual labour and relieve the engineers?—Exactly.

3044. Why should the engine-room artificers be above doing work in the dockyard, they have entered as workmen?—I cannot answer why, but I do not think that you would find the thing work; that is my opinion.

3045. (*The Chairman.*) Would not that difficulty to a certain extent vanish, if it were made optional for the engine-room artificers to take service in the dockyard for a few years, retaining their privileges as engine-room artificers?—I do not think so. I do not think you would get any volunteers. I should look upon them in the same light as coastguard men, who land and never go afloat again except in time of necessity.

3046. (*Mr. Wright.*) If you reduced the number of engineers, and entered a sufficient number of engine-room artificers to make up a reserve, you would have about 600 more than you have at present, and you would need to find employment for them?—I think that could be arranged; if you are going to employ a number like that, you could have a muster station at once and keep them apart.

3047. (*Captain Commerell.*) With regard to the coastguard men theirs is hardly a parallel case. Unfortunately, the coastguard man is losing his knowledge of seamanship, but the engine-room artificer would be keeping up his knowledge?—Yes, his working mechanical knowledge, but he is losing what he would require to have in the event of war.

3048. Do not you think that a man once an engineer would be always an engineer?—No, he may have theoretical knowledge, but machinery has altered very much of late years, and his practical knowledge of it would be somewhat rusty for a time, if he had been on shore for, say, five years.

3049. (*Mr. Wright.*) If you were chief engineer of the factory, and 100 or 200 engine-room artificers were turned over to you, would you have any difficulty in employing them profitably?—Not at all, my difficulty at present is in having more work than men to put upon it; that is the reason we cannot keep pace with the programme of work to be performed within the financial year.

3050. Do you think that there would be a difficulty with the engine-room artificers themselves, through their not complying with the dockyard regulations?—Exactly; that is my opinion.

3051. But the dockyard regulations would not be so difficult to comply with as the regulations on board ship?—They would be searched by the police, and so on, on going out of the dockyard, which they would not like; if they are trustworthy people they will not

W. H. Stell,
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W. H. Steil, Esq., R.N.
27 Oct., 1875. pilfer from the establishment; and, wearing their uniform, it ought to show that they are what they represent themselves to be.

3052. (*Captain Commerell.*) Do not you think that there would be some danger in placing them in a superior position to that of the ordinary factory men?—Yes, at first I think there would be, but that would all wear off; there is no doubt it would bring about a little trouble at first.

3053. (*Mr. Covey.*) With regard to those men who are now entered as engine-room artificers, such as blacksmiths and armourers, would you like to take them in the factory?—Yes, if an armourer could produce his indentures.

3054. You ought to draw them from a particular source?—Yes, and then you would have to put up with a radical change.

3055. Do not you think it would cause some disagreement in the factory with the other men?—It frequently occurs. I should not like every man to produce his credentials. One of our best mechanics that we have now, who occasionally takes charge of work in the engine-room, was nothing but a leading stoker, but he improved himself.

3056. (*The Chairman.*) Do you think that if trade boys were entered with the understanding that they were bound to go to sea as engine-room artificers when they were fitted for it, that we could get as many to enter as we do now?—Oh, yes; there would be plenty of applicants.

3057. You have a great number of applicants now, have you not?—Yes, at least 150 have sometimes been on the list; and they are mostly the sons of the working men in the dockyard.

3058. (*Captain Commerell.*) Could not the factory boys be borne on the books of a ship to go to sea at a certain age, the same as is the case with boys in the training ships?—You would have to extend the apprenticeship; that is a thing which I am an advocate for, as with the engineer students, that they should serve a certain number of years and then go afloat, before they were entered as engine-room artificers.

3059. On board the training ships, we take a boy at the age of 14, and say, "now, we give you such an education on condition that at the end of a certain time you are bound to serve us for 10 years." Could you get your factory boys to do that, do you think?—I think so; that would be the bond.

(*The witness withdrew.*)

WILLIAM THOMAS MEAD, called and examined.

W. T. Mead.
27 Oct., 1875. 3060. (*The Chairman.*) What position do you hold in Portsmouth dockyard now?—I am in charge of a party of fitters, doing repairs on board ships.

3061. Is that the same as a leading man?—No; there are leading men over us in charge of about 180. I am in charge of a party, according to the size of the job we have.

3062. How long have you been in the dockyard?—About three years.

3063. Where did you serve your time?—A part of my time at Salisbury and the rest at Humphreys and Tennant's.

3064. Marine engineers?—Yes.

3065. Did you remain with them after you were out of your time?—I left them, and went back afterwards, and worked for about twelve months for them.

3066. And you came from there to the dockyard?—I went to sea.

3067. As what?—As an engineer in a merchant boat.

3068. How long were you at sea?—About 14 months, very nearly.

3069. In what Company did you serve?—Messrs. Briggs, Johnson and Company, of Hull.

3070. What horse-power was the ship?—150 horse power, and compound engines.

3071. How many engineers were there?—Three engineers.

3072. Were you an engineer?—I was a third engineer; the chief engineer was an engineer who had been in the service, Mr. Wilson.

3073. What pay did you get?—Nine guineas a month, and all found.

3074. Why did you leave that service?—I saved a bit of money and got married, and my wife persuaded me not to go to sea again.

3075. What pay do you get in the dockyard?—38s. a-week, 6s. 4d. a-day.

3076. Have you had that pay ever since you have been in the dockyard?—I have had that pay about eighteen months. I had 6s. a-day before. I am expecting another rise of 2s. a-week very shortly.

3077. Do you belong to the trades union?—Yes.

3078. What advantage do you derive from that?—I have never had any advantage from it; if I am thrown out of work I shall get 10s. a-week. I am not a rash trade unionist.

3079. The trades union would support you when sick, would it not?—Yes.

3080. (*Captain Dowell.*) Would it support you in old age?—According to the number of years I belonged to it. If 15 years, I get 7s. a-week; if 20 years, I get 8s. a-week for life; and in case of my receiving an accident, which incapacitates me from work, I get £100 down.

3081. (*The Chairman.*) What does your widow get?—A gratuity of £12.

3082. What do you pay?—Ninepence a-week.

3083. Is there a varying scale, because some men pay more and some pay less?—I belong to the old class of steam engine makers, and there is another society which is called "The Amalgamated Society," in which they have to pay 1s. a-week. They take smiths and boilermakers.

3084. Why do not you go to sea as an engine-room artificer?—Because the position is not good enough.

3085. What would make it good enough?—If there was more money for one thing, and a little better position for another. I am not going in for a better position altogether, but I mean if they had a mess berth, so as to keep them from the lower deck. Now, they have to associate with the stokers; and, if that is the case, a man cannot keep his place in the engine-room. Another thing is the wash-berth. Now, you have to wait until all the stokers have washed themselves before you can get a chance of washing. Another great point, which I know our fellows look at, and which prevents them from going into the service, is the interference they receive from the ship's corporals and masters-at-arms. The master-at-arms has great power over them. I have known ships, which I have been on board lately, where the engineer lets them knock off work at one o'clock on Saturdays, and they cannot go on shore until they have the leave of the master-at-arms to go when the liberty men go.

3086. At what time is that?—Not until five o'clock in the evening. I have known cases where a ship's corporal has put his veto on it; he has gone to the first lieutenant and stopped a man's leave. Another thing we look to is this: since this class has been introduced into the navy, there has been a rare lot of boilermakers and smiths go in; they are the majority going into the service; the few fitters that have gone in are really worthless. I know of several cases where men have been discharged from the dockyard, and they have gone to the steam reserve office and joined the service, and not had a trial job to do; a man who has been working here for 37s. a week, and men who

have been working for 29s. a-week, they have gone into the service without a trial job; and if we went into the service they would be our seniors, and, if any advantage was to be gained, they would get it.

3087. (*Captain Dowell.*) There is an examination of them, is there not?—Yes, an examination; but I mean with regard to their practical work. The artificers now in the service classed as fitters, if you took them into the engine-room and asked them to explain the different working parts of an engine, could not do it; that is one of the things that would prevent us men from going into the service; if there was more money we might, perhaps.

3088. What pay on first entry do you think they would be entitled to for their work?—If they had about 6s. 6d. or 7s. a-day on entry, and rose to 8s. 6d., making a different class of them, they would be very well satisfied then.

3089. Why will not the men go to sea for the same pay that they get on shore?—Because they give up all comforts; there are some comforts when you are staying at home, especially if you are a married man; there is a lot of risk in going away, climates and so on; you have to take a lot of risk that you never get on shore. There is another thing which we look at, and that is the pension; we have never received anything official as to what the pension would be. I have been told by artificers that we shall only get the same pension as a leading stoker.

3090. Do you realize that it could be as much as £45 a year or £50 a year?—It ought to be more. We look at it in this light, if we go away to sea for 20 years or more, the pension ought to be something to enable a man to keep himself without working after that time.

3091. (*The Chairman.*) Is there any position in life in which you can get that?—No, but that is when one is getting very old.

3092. Is there any position in life where you can get a pension for doing nothing?—No, unless it is in the service. There are some who do. Mr. Wilson has a pension of £20 a-month, and he has no wife or family.

3093. What age was he?—45 or 46 years of age, I think he must be nearer 50 though; but he had plenty to live on, £20 a-month. About seven years ago, when I was in Portsmouth, I went to the steam reserve office, and I was given to understand that after twenty years service a man would get a pension of £75 a-year; and I know a lot of men who are under the same impression.

3094. Then you think that the prospect of a pension is one of the inducements for the men to enter?—Yes.

3095. For a thoughtful man?—Yes. That would be the thing to induce me to leave my position now, and go into the service, having a young family coming on. A man may stay in the dockyard all his life, and never be able to save anything for them; whereas, if he went to sea and saved a little money, and got a pension in his old age, it would be something worth having.

3096. Would it be an inducement for a man to join the service if he felt sure that after a few years at sea he would be employed at the same rate of pay in the dockyard or steam reserve?—I think that that would be an inducement, if he got the same pay as he would be getting at sea.

3097. Should not you think that the present system of the better men being employed in the steam reserve, as they are now for a period, would be another inducement for them to look forward to?—If I joined the service I should like to go away to sea.

3098. But after six or seven years of service at sea you would like to get a little spell on shore, would you not?—Yes, that would be an inducement.

3099. Supposing the pay on entry were raised to 5s. 6d. per day, and gradually increasing to, say, 8s. or 8s. 6d. per day, do you think that would enable us to get some more men from the factory?—How would they get up to 8s. 6d. per day?

3100. By a progressive rate of increase every three

years?—You have a lot of boilermakers and smiths in the service now, and that would give those men seniority over all of us. They would go into the first class before us.

3101. That would not hurt you?—In some ships they would be giving a man the engine-room watch, which, because he was senior he would be entitled to, but I should not like to see a boilermaker keep the engine-room watch while I was in the stokehold.

3102. Do you consider that a fitter is better than a boilermaker?—He is a far more respectable man, and a higher class of men belong to the fitters' trade.

3103. Do they get more pay?—Yes, I get 38s. per week.

3104. (*Mr. Wright.*) Do the boilermakers and smiths belong to your trades' union?—The smiths belong to the Amalgamated Society of Engineers, and not to the one I belong to. If you go to sea in the merchant service, an engine fitter can begin as fifth engineer, and rise to chief, but once a boilermaker always a boiler maker. At the present rate, the boilermakers and smiths are bettering themselves by going into the service.

3105. (*The Chairman.*) But the fitters are not doing so?—No, a boilermaker is not much good on board ship, because most of the work you generally see on board ship is just the screw patching or tubing, and if you go into a locomotive shop you will see that is the fitters' work.

3106. Is not a boilermaker useful as regards the whole of the hull of an iron ship?—Yes; if he had that to do; I look at it in the light of going ahead of us, and being our seniors; and to have a boilermaker over a fitter would not do.

3107. Does not that result from the fitters not entering early enough?—But that is because the position is not good enough; the boilermaker betters himself by entering the service, but the fitter does not do so.

3108. (*Captain Dowell.*) In stating your pay, did you count seven days in the week?—Yes, every day.

3109. Did you take into consideration that in the service you would get so much more pay; you are now receiving 6s. 6d. a-day, and you would be receiving 6s. 6d. a-week more than you do now in the navy, besides having rations?—But I should have the extra work to do for that; I should have to work hard at sea on Sundays.

3110. Do not you take into consideration the rations?—No; but if a man had to live on the rations served out to him in the navy, I do not think he would get very fat.

3111. Do you mean to say your living on board ship would cost you as much as living on shore?—No, not so much as living on shore.

3112. (*Captain Commerell.*) The men in the steam reserve are now getting 7s. 7d. per week, in addition to their pay?—Yes.

3113. (*Captain Dowell.*) Do you think that the uniform which the engine-room artificers have to wear is any cause of discontent with them?—I was told to mention that they would like to have a frock-coat; as far as I am concerned I should not care about that.

3114. Why do they wish to have a frock-coat?—They wish for a frock-coat for this reason, I think; uniform costs a lot of money, and if a man's trousers get shabby a frock-coat helps to hide it.

3115. Would a frock-coat last as long as a jacket?—For my part I would rather wear a jacket.

3116. Then you do not think there is any reason to complain of the uniform?—No.

3117. (*Captain Commerell.*) Have you heard anything about the mess arrangements on board ship?—Yes, very much. They are not particular where they mess, so long as it is away from the lower deck, so as not to have to mix with the stokers. They have to mess on the lower deck, and perhaps next to them is a mess of stokers, who take liberties with them when off duty; and if that is the case, you cannot keep your place when in the stokehold or engine-room.

W. T. Mead. Then again, I believe you can be forced to scrub out the mess; a man may be a very good fitter, but no hand at scrubbing.

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3118. Your principal objection appears to be, first of all, that the boilermakers and smiths are put on a par with the fitters; and in the second place, you do not get enough pay; and in the third place, that your mess arrangements are not satisfactory?—Yes; and the mess arrangement is a great point with us.

3119. Which is the greater point of all?—The mess and the master-at-arms are the greatest points.

3120. When you say the master-at-arms, does not that mean the discipline of the ship?—Yes; but if you get leave from the chief engineer to go on shore, you cannot go without getting leave from the master-at-arms, and they make themselves very officious and stop it; they say, "I cannot go, and why should you?" I have heard that remark frequently made on board ship when working on board. They say, "stop till the others go," and a man has to knock about the ship until he can go, although he has got leave from the chief engineer.

3121. Do not the engine-room artificers understand

that the master-at-arms is merely the mouth-piece of the commanding officer?—Yes, but I have no hesitation in saying that he exceeds his duty in many cases, and the commanding officer is not aware of it.

3122. You are aware that the engine-room artificers rank with the chief petty officers?—Yes.

3123. And therefore the arrangements and orders which hold good for one chief petty officer must hold good for another?—Yes.

3124. Which do you think that the engine-room artificers would sooner have: to give up all relative rank, and be exclusively under the orders of the chief engineer, in the engine-room, or retain their relative rank as now, and be under the same regulations?—They would rather be under the chief engineer.

3125. Do you think they attach much importance to their relative rank?—No. I think we are classed somewhat lower than the master-at-arms; the engine-room artificer is about eleventh on the list; it would be a great advantage to us if we were put under the control of the chief engineer.

3126. And give up all relative rank?—Yes, and give up all relative rank.

(The witness withdrew.)

CAPTAIN CHARLES L. WADDILOVE, R.N., called and examined.

Capt. C. L. Waddilove, R.N.

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3127. *(The Chairman.)* What position are you now holding?—Captain of the steam reserve and of the "Asia."

3128. What ship did you last command?—The "Black Prince" for a short period, and the "Inconstant" before that.

3129. Have you superintended the examination of the engineer students at the dockyards before joining the navy?—No, the engineer students are sent to our factory to go through a job to satisfy our officers that they are competent to take a job of the kind; although I sign their certificates, I cannot say that I superintend the work so as to be able to give any opinion about it.

3130. They are examined by the inspector of machinery in the steam reserve in conjunction with the chief engineer of the yard?—Yes, and I sign their certificates, but in many cases, from knowing so little of it, I have altered the "examined in presence of" to "approved," which I think is a more desirable thing.

3131. Is the test work done in the steam reserve or the factory?—In the steam reserve.

3132. Are you aware whether the reports you have generally heard of them are satisfactory?—Yes.

3133. Of the test work in fact?—Yes, I go very much upon the certificate which is signed by the chief inspector, who has satisfied himself as to the quality of the work.

3134. Does the certificate vary in wording, or is it the same for all?—It varies from "very good" to "fair," I think; but I am not quite sure upon that point.

3135. With the exception of the examinations, the engineer students do not come under your notice or control at all as engineer students?—Not at all.

3136. From the experience that you have had of the young engineers after joining the service, are you satisfied with their ability as workmen, as a rule?—I should say, certainly.

3137. Which do you consider would turn out the best job of work in the quickest time, an engine-room artificer, fitter, or an engineer student?—If I take my own experience back throughout all the ships I have commanded, I may say that I think the most perfect work has been done by the engineers, but in later commands, especially in China, I saw some reason to suppose that among some of them there is a tendency to give up doing hand work.

3138. Do you think that there would be any ad-

vantage in reducing the number of engineer officers in the service, and increasing the number of engine-room artificers?—I do not see any advantage in reducing the number of engineers, except that it would give a better chance of promotion. By having such a large number of engineers as you have now, you have not the means of giving promotion. They must remain for a long period engineers, and cannot become chief engineers till a very late period, which is not satisfactory. Supposing the position were made such as to bring good men into the service, I should certainly prefer having a larger number of engineers, or the number we have now, and not reducing that number to replace them by engine-room artificers, but it must be quite understood that every engineer is able and willing to put his hand to work, if necessary.

3139. Do you think in a large ship, where there are nine or ten engineers, that the work which the junior engineer has to perform requires a highly educated man holding the high position that the men in the service hold?—No, but any moment those junior engineers may be required to take charge of the engines, even in a large ship. I think the staff of a ship ought to be sufficiently large so that the engines should never be left except to the charge of a thoroughly competent engineer.

3140. Would you think that necessary in small ships, or are you aware whether an engine-room artificer could take charge of the engine-room in a small ship?—I believe they do so.

3141. Why do you consider that an engineer officer is more capable of taking charge of the engine-room than an engine-room artificer?—Because he has been more highly educated, and his attention has been given more to it. The engine-room artificer, when he comes into the service, knows little or nothing of the engines; he knows the actual manual fitting, but in many cases, I think, he does not know what the fitting is for; that information is obtained after he joins the service.

3142. Then you think it desirable that we should always, under any circumstances whatever, retain a sufficient body of engineers in the service?—Yes.

3143. And well educated men?—Yes, and well educated men.

3144. Are you aware that some of the young engineers when they go to sea have never had control of an engine or learnt anything of its management?—I am not, and I think that management of an engine ought to form part of their education.

3145. If that be the case they are very little better than an engine-room artificer?—No, but I suppose they do not have charge of the engines immediately, they work under supervision.

3146. (*Captain Dowell.*) That depends upon the ship in which they are?—So far as my own experience goes, in a case where an inexperienced engineer comes to a ship, and is obliged to take charge of the engines, it follows that the chief engineer spends his time with him in his charge for some very considerable period until he is satisfied that the man is competent to take it alone.

3147. (*The Chairman.*) Do you find that any of the young engineers are good boilermakers?—I cannot say.

3148. Have you ever found any?—I cannot say, because although I have known boilerwork done on board ship, I could not say whether it was done by the engineers, or by the stoker mechanics, or what branch did it.

3149. Do you think that the engineers, as a rule, are satisfied with their position?—I have not had very great opportunities of judging, as, on account of my position, I do not think it right to ask any question; but judging from the letters that I see in the newspapers, and some conversation with officers that have served with me, I should think not altogether.

3150. Do you think that they have any reasonable complaint to make?—The slowness of promotion is one, and that I do not myself see any remedy for, because the number of engineers required in the junior ranks is so much greater than the number required for the heads of the profession, it seems to me to come very much in the same way as every other profession. No person can possibly expect to get to the top, as the chances are so much against him.

3151. For the good of the service, at what age do you think a man should be promoted to the rank of chief engineer?—For the good of the service, say at about 35; from 30 to 40, I might say.

3152. (*Captain Commerell.*) That is a large margin?—Yes, it is a large margin; and should be understood to mean that an officer ought to be quite fit for a chief at 30, and has well earned that rank at 40.

3153. (*The Chairman.*) You mean not earlier than 30 and not later than 40 years of age?—I think, for the good of the service, he ought to be promoted by the time he is 40; if he is not fit then for a chief, he will not be worth having afterwards.

3154. It appears that in the year 1866 the general age at which a man was promoted to the rank of chief engineer was 33, now it is 43; do you think that is a reasonable ground of complaint for men who entered the service before that time?—I think from 1853 to 1855 the promotion amongst the engineers was very rapid, owing to the very large increase we required during the Russian war. The entries were also large, and stagnation of promotion followed upon that (although I can hardly say it is a ground of complaint), as one of the necessities of the service. I think it is very likely that if it could have been foreseen it would have prevented many men from entering the service; they entered under the impression that they would have rapid promotion, but they have not got it.

3155. Are you quite satisfied, as far as your own judgment leads you to believe, with the position of the engineers at present; with the numbers appointed to each ship, and with their training and qualifications?—In what way with the position of the engineers?

3156. By position I mean as regards their promotion and the position they hold at present in a man-of-war?—I think that their promotion is slow, but I do not see how that can be helped, except by retirement. Their pay is small for their responsibility when in sea-going charge, and is not progressive with their rank; their rank is, I believe, sufficient, but I believe in many cases they complain that they do not get the benefits of relative

rank. I may mention one case that happens to be under my own observation at this moment, that is, that the chief inspector of the channel squadron cannot have furniture for his own cabin, which is allowed to the commander of the ship, his junior officer, and which has been allowed in many cases to the staff commander.

3157. Is the secretary of the commander-in-chief in a similar position?—Yes; they are both in the same position, both having relative rank. I think that it would be better for the Admiralty to give authority for furniture to be allowed according to relative rank.

3158. Do the chief engineers get any furniture allowed in their cabins?—I think not. I fancy that another cause of complaint is the time which they are allowed to count for pension, the time for retirement not beginning to count until they have been in the service for a long time. I am speaking now of the chief engineers. In my opinion, their time for retirement, and all benefits arising from pension or retirement, ought to begin to count from the time of their being confirmed, when they may be assumed to be masters of their trade, and not requiring any experience.

3159. In the steam reserve workshop, do the engineers and the engine-room artificers work at the same bench?—Their work is very much divided over different things, and they follow their work, whoever may be on it. For instance, I mean, if an engineer had a job in hand with an engine-room artificer attached to him to work at that job, they would necessarily work together at the same place.

3160. Do the engineers dislike that, do you know?—I am not aware of that. At least, I believe there is some dislike to working at all in the factory or workshop, but I think that sort of feeling probably follows upon a man's qualifications; that I cannot say for certain; but I think that a man well qualified for the work likes it, and when he feels that he is not up to it, does not like it; that is my impression.

3161. Do you think that if the engineers require a higher education, theoretically, than the engine-room artificers, that it can be possible at the same time to give them an equally good practical education?—No, certainly not; unless you give them a longer time to prepare.

3162. Is it not a necessity that we should have workmen in the engine-room of the best possible character and qualifications?—It is desirable, certainly; but you sometimes find that some of the best workmen are not of particularly good character; in fact, some of our best stoker workmen, both as mechanics and stokers, are second-class conduct men.

3163. Do you find that to be the case with the engine-room artificers?—I have seen no case of that kind, because an engine-room artificer, when required to be disrated, must be discharged.

3164. Have you been satisfied with the engine-room artificers, as a rule, and with the way in which they have done their work?—Yes.

3165. Are you aware whether there is great difficulty in getting them of any particular trade, such as fitters or boilermakers?—Coppersmiths it is almost impossible to get.

3166. At Portsmouth?—From anywhere, I think. Fitters are generally the next most difficult, and the smiths are the easiest.

3167. (*Captain Dowell.*) Does that include boilermakers?—No; really good boilermakers and fitters go pretty well together, but smiths are the easiest to be obtained.

3168. (*The Chairman.*) Do you, in entering engine-room artificers in the reserve, limit the number to each trade?—No; we get them where we can get them. I may mention, with regard to coppersmiths, that we have had two very good workmen as candidates for entry, but they could not pass the very slight educational examination which we give them, which is little more than being able to add up the amount of coals used in the engine-room. As soon as they were shown that they had anything to

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do with figures, they said, "it is no use our trying, we cannot do it." They left the office, intending, I believe, to get some instruction at a night school, and then return; but they have not been again.

8169. Do you think that the pay offered now to engine-room artificers is sufficient to induce good men to come, supposing we wish to increase the number of them?—I think the pay is sufficient to attract good men, except first-class fitters and copper-smiths. I think you can get thoroughly competent fitters, and you will get any amount of ordinary smiths.

3170. From the dockyard, or from the private trade?—From both, I think; but I think in the case of the dockyard, it would probably follow, that if a man sees his way to continual employment in the dockyard, he would not wish to go to sea. In the private trade also, when certain trades are thrown out of work, I think they would gradually come to us. As bearing upon this point, I would mention to you, that somewhere about May or June of last year, 1874, we were getting no artificers, and could not get any for some considerable time. I suggested to the admiralty that they should advertise for them in the "Engineer" and "Iron," and other professional papers, and make known the want, and direct the drill and district ships at Liverpool and other places, to enter men. When the first batch came down from Liverpool, which followed very quickly upon the advertisement, I asked as many questions as I could, and I found out directly that they did not know of the want in the navy at all until that advertisement appeared; that the first morning it was seen, which happened to be a Monday morning, there were about 80 men went on board the district ship to enter, out of which number something like 22 were medically rejected; the remainder came down here, and they were followed by others, until our number was complete, and we were obliged to stop them. From inquiries and conversation which I had had previous to that, I was myself under the impression that the supply had been entirely obtained from the dockyard, and that the want of them was not generally known; that the artificers in the yard felt that they would oblige the Admiralty to give them what terms they wanted; but as soon as our want was made known to the private trade, supplies came in from the outside, and supplies also came in from the dockyard. The men coming complained very much, and the men in the service do still complain, I think, of the size of the chest which they are allowed, which is smaller than that which is allowed to the master-at-arms.

3171. Do you know the size?—I do not know exactly, it is 2 feet 8 inches by something, I think. I know the two chests relatively. At first the men had no idea of discipline whatever; but it was explained to them, and they were tolerably satisfied. I am of opinion that the chest ought to be the same as that of the other chief petty officers.

3172. (Captain Dowell.) In other chief petty officers you include the master-at-arms?—I mean all chief petty officers, the chief captain of the fore-castle, chief quartermaster, and others have nothing but a bag; still all these things dovetail into each other very much. I wrote letters upon the subject of the artificers, I believe in reply to one from the Admiralty, and I have never seen any reason to alter the opinion that I therein expressed. The letters were as follows:—

"Engine-room artificers, Entry of.

"Sir, 13th August, 1874.
"In compliance with your minute of the 10th instant, on Admiralty letter, dated 7th August, 1874, W., desiring me to report whether I can assign any reason for the difficulty experienced in getting engine-room artificers, and also to report what measures I would suggest to ensure the number of 15 being kept at this reserve.

"I have the honour to report with reference to the first part of the subject, that there are no large engi-

neering works in the neighbourhood from whence we can expect to get a supply, and I doubt if the want is sufficiently known in the large engineering towns such as Liverpool, Manchester, Birmingham, Sheffield, Newcastle, Shields, and their neighbourhoods, Middlesborough, the Clyde and the Forth, if it were, I can hardly doubt but that many young men, just coming out of their apprenticeship, would be glad to come at the present rate of pay.

"The only reason I can assign for men not coming is, that they can get as good or better pay in factories on shore, where they are free from the restraints and inconveniences of a ship.

"2. The rate of wages in private factories has, I believe, been unusually high during the last two or three years, which has probably added to the difficulty.

"3. With regard to the steps to be taken to obtain and keep up a supply, I would recommend that the fact of there being such an opening should be made known in the large engineering towns by the issue of handbills, and also by occasionally advertizing in the "Engineer," "Iron," and such other newspapers as are likely to be largely read by the working men in such towns, but to prevent disappointment by men coming down when there are no vacancies, the advertisement should desire them to apply by letter to the captain of one of the steam reserves.

"4. The district ships at Liverpool, Greenock, the Forth and Hull, might probably be able to enter some, the candidates being medically examined on board by the staff surgeons, and provisionally examined by the chief engineers before being sent to the reserve. Newcastle and its neighbourhood would probably furnish some from the large works on the banks of the Tyne, these men should be medically examined on board the drill ship at Shields, but could not, as far as I am aware, be examined as to their qualifications.

"5. The greatest care should be taken that the men before entering understand the drawbacks of their bargain as well as the advantages, for nothing deters candidates more than seeing men return who have gone to ships to enter, and have found themselves, as they think, misled as to the advantages, and for this reason I should prefer the entries being made in the district ships, where candidates would hear particulars of the service.

"I would also suggest that the captains of the steam reserves should be authorized to communicate with the district captains, captains of drill ships, and recruiting officers when there are vacancies, and engine-room artificers are required.

(Signed) "CHAS. L. WADDILOVE,
"Captain S. R.

"Commander-in-Chief.

"P.S.—It is very necessary that the two following points should be clearly understood:—

"First,—Whether an engine-room artificer is, or is not, liable to be disgraced for misconduct; if he is, to what should he be disgraced?

"Second,—What is the minimum amount of pension an engine-room artificer will be entitled to after twenty years' service, bearing in mind that if not liable to be disgraced the whole of his time would be chief petty officer's time.

(Signed) "CHAS. L. WADDILOVE,
"Captain S. R."

"Engine-room Artificers, Entry of.

"Sir, 24th August, 1874.
"With reference to previous correspondence, and my letter dated 13th instant, as to the cause of not getting engine-room artificers.

"I have the honour to report that, in conjunction with Mr. Oliver, chief inspector of machinery of this reserve, I have been endeavouring to obtain further information on the subject, and although it is difficult to get at details, I am confirmed in my opinion that it is not so much the pay which causes the difficulty in getting engine-room artificers as the small inconveniences incidental to life on board ship, which are

more felt by men of mature age than by those who have been brought up in the service as boys, and the petty annoyances caused by the interference of the master-at-arms and ship's police in small matters, such as cleaning their mess, leave, &c., which cause men already in the service to give it a bad name, and thereby deter others from entering.

"2. I have no doubt, from my own observation, the engine-room artificers have in some measure brought these annoyances on themselves by endeavouring to assume a superiority over other chief petty officers on account of the superiority of their pay, an assumption which is naturally resented, and leads to petty squabbles.

"3. I believe that a very great deal of jealousy exists between the non-executive chief petty officers and the seamen chief petty officers, the former claiming undoubted superiority on the score of having entered the service as chief petty officers; the latter, who to the best of my belief, do not put forward any absurd claim, holding that their position is equal, and has been gained by a long course of hard service and proved good conduct.

"4. A remedy for all this would appear to be that all chief petty officers, including the master-at-arms, schoolmaster, writer, &c., should *bona fide* mess in the chief petty officers' mess, they would then be messmates, and a great deal of the bickering that now exists would cease.

"5. It should be clearly understood at all dock-yards what sort of special fittings is to be provided for a chief petty officer's mess, and that fitting, whatever it may be, should be sufficient for all the persons in the complement holding the rating of chief petty officer.

"I would add to my previous suggestions that if men with the required qualifications can be procured from leading stokers, mechanics, armourers, blacksmiths, &c., they are a good source to draw from, and should be encouraged to look forward to obtaining the rating of engine-room artificer.

(Signed) "CHAS. L. WADDILOVE,
"Captain S. R.

"Commander-in-Chief."

3173. (*The Chairman.*) You consider that it would be desirable that the master-at-arms, the executive chief petty officers, and the engine-room artificers should all mess together?—Undoubtedly. When I was in the "Inconstant" we had two engine-room artificers, both very good men in their trade; but when they first came there were frequently squabbles about their mess. I insisted through the whole time that the master-at-arms, and all persons bearing the rank of chief petty officers, should be regarded as being on the same level and members of the same mess; and from the time that they settled into that I never had another squabble.

3174. How did they clean their mess out?—A couple of boys were allowed for the mess.

3175. Who cooked for them?—The ship's cook, with such assistance as the men themselves chose to give. I certainly believe that the blue-jacket chief petty officers did assist in cleaning the mess themselves, but I cannot say whether the engine-room artificers did or not, but if they did not they were actually occupied in the engine-room; and I believe it was not at all grudged to them, as they were known to be at work elsewhere.

3176. One of the objections which they have to their service afloat is, being compelled by the master-at-arms to clean their mess, and also in being restricted as to their leave, the same as the other chief petty officers, although their work in the engine-room may prevent them from taking advantage of the opportunities of leave that the other chief petty officers have. Do you think that they have any reasonable ground of complaint in those respects?—I think that the master-at-arms, being in fact, one of their messmates (they are chief petty officers messing together) would remove it, and that was my experience in the

"Inconstant." With regard to the leave, I think it is very probable that occasionally the master-at-arms, in his present position, tries to assume the right of giving leave instead of his being merely the means of forwarding the request to the commanding officer, which is resented by them and the other chief petty officers. Leave is a question with which the master-at-arms ought to have nothing to do, he being merely the mechanical writer of the commanding officer, and in that respect I do not think there ought to be any complaint so far as he is concerned. I have often found men who have been brought before me with any request complain that the master-at-arms said "I cannot give you leave."

3177. Which you think might apply to the engine-room artificers?—Yes, the master-at-arms only meaning to say "It is not your turn, therefore, I cannot put your name on the list."

3178. Do you think that the master-at-arms and executive chief petty officers would have any objection to offer to these men coming out of the stokehold into their mess in their dirty clothes, as they must on many occasions?—I think that the occasions are few when they need do so; they would be confined to the coaling and heavy work when everybody is pretty well in a dirty dress.

3179. It has been suggested that a mess place might be found for the engine-room artificers, especially if they were increased in numbers, upon the engine-room flat, or in the vicinity of the engine-room, entirely under the chief engineer; would you see any objection to that if the engine-room artificers preferred it?—I think it would be objectionable; in the first place it would be putting the men to mess where the ventilation is bad and the heat great, and in the second place it would only be a step for claiming a better place in some other part of the ship.

3180. Do you know where the engine-room artificers mess in the "Sultan"?—No, but I do in the "Monarch."

3181. Where is that?—In the "Monarch" all the chief petty officers have a very good mess in the after part of the starboard side of the lower deck.

3182. Is that including the master-at-arms?—Yes, who has a place behind for his office. I believe the system is carried out there of the chief petty officers being all *bona fide* messmates; whatever the fitting may be for messing for the chief petty officers, it should be distinctly understood at all the yards, which at present is not the case.

3183. You mean to say that it should be an universal fitting for the fleet?—Yes, as otherwise it only causes invidious distinctions and comparisons between the different ships. I believe I have already said that I think the engineers have a cause of complaint, sometimes through the advantages of their relative rank not being given to them, amongst others, that invitations in some ships are not sent to them when they are addressed "To the Captain and Officers."

3184. Do you think that they should be sent to them?—Most decidedly; I have always done it and never had any reason to regret it.

3185. Are you aware of the class from which the engineer students are now drawn?—No, I am not; but I am aware of this, that the Admiralty has assigned them a particular rank, and I consider, myself, that as captain of a ship, I have no right to take from them the advantage of their rank when invitations are addressed "To the Captain and Officers." I consider it the right of the people sending the invitations to address them to whomsoever they choose; but if they come addressed in that way it is my duty to forward them on.

3186. Would you include the warrant officers?—To be consistent, I should, but I have not, because they never wanted it.

3187. Would you advocate the abolition of the engineers' mess and the engineers being admitted to the gun and ward-room mess?—I think, to be consistent, that ought to be the case.

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3188. Do you refer to those engineers who are commissioned officers or to all engineers?—To all engineers.

3189. Would you put them in the gun-room mess or the ward-room mess?—That would be according to their relative rank. I think the rule with regard to relative rank should apply to them in the same way as it applies to all others. In fact, I should say that the messing and other privileges should go strictly in accordance with relative rank, and that in giving relative rank the proper authorities should consider what would follow it.

3190. Are you aware of the mode adopted for the entry of engineer students in the dockyard?—I believe it is by competitive examination.

3191. Are you aware whether there is any selection of the candidates?—I am not aware of that.

3192. If you understood that the engineer students were admitted from any class of society, some, for instance, being the sons of dockyard labourers and the sons of privates in the marines, and of washerwomen, and that they remained during their six years' training in the society in which they were born; would you consider it desirable to admit those men to the gun and ward-room messes, more especially if the sub-lieutenants were removed from the gun-room mess, and that mess consisted of midshipmen and young engineers only; do you think that would be wholesome training for the midshipmen?—No, and therefore I think that the entry ought to be by nomination; that nomination once given, I think that the other rule ought to apply; the difficulty would be in dealing with the entries you refer to from those classes.

3193. Do you think that if the candidates were nominated by the Admiralty, we should get volunteers from a higher social class than is at present the case?—I think probably we should, provided they saw some competence to be obtained at the end of their career, and were treated in accordance with former position while serving.

3194. Would you make any change in the training of the young engineers and engineer students, with the object of obtaining men of better social rank than we have had lately?—I do not think that I know enough of it to be able to give an opinion; but I believe it is desirable that there should be more practical work taken out of them.

3195. (*Captain Dowell.*) Have you had the entry of engine-room artificers?—Yes.

3196. What examination do they pass?—They pass, on first coming, a slight examination in arithmetic and reading, and they are asked questions to ascertain that they know something about an engine; the cocks and valves, and so on. They are then sent on to the factory where a job of work is put into their hands, which they have to do; that work is conducted under the supervision of the foreman of the factory, and it is retained for future reference. It sometimes takes them two and sometimes three days to do it.

3197. How many of those men that were sent down to you from Liverpool passed the examination?—Every one of them. Since March, 1874, we have entered from the private trade 21, of whom 18 were fitters, two boilermakers, and one a smith. At this moment we have candidates for entry when we get vacancies, five smiths, six fitters, two boilermakers, and one coppersmith, all from the dockyard, with the exception of three fitters. I may, perhaps, add here that I think the entry of engine-room artificers, under one term as "engine-room artificers" a mistake—their wages in the private trade vary, and I think their wages in the service ought to vary. I do not think it is at all necessary to enter ordinary smiths as engine-room artificers at all; but we require a few enginesmiths, who ought to be good workmen and able to work large iron, say five-inch.

3198. Would you limit the entry of engine-room artificers to fitters, boilermakers, and coppersmiths?—Yes, and angle-iron or enginesmiths. I should think

it would be desirable to enter them in the name of their trade, reserving the rating of "engine-room artificers" as a further rating, or something equivalent to promotion to warrant officers. The only reason that I can see for their being entered under one term, as they now are, is to reduce the number of entries in the ship's books.

3199. Do you think it would be for the benefit of the service that engine-room artificers should be allowed to rise to the rank of warrant officers?—I think it would be fair to the engine-room department, being a very large body of men with a very considerable amount of work, that they should have some such prize within the reach of a limited number, something in the same proportion as it is for the blue jackets and other grades; it should only be given after long service, and they might then remain for work in the reserve, and must continue *working* tradesmen.

3200. Would you propose in that case to put the engine-room artificers to mess with the warrant officers?—Yes, of course I should, if you give them the rank, you must give them the position.

3201. Do not you think that that class of men would care more for increase of pay than increase of rank?—I think very likely they would, and if you do it by increase of pay, I should prefer it throughout, in fact I see no reason why engine-room artificers should be called chief petty officers if you entered them in the name of their trade and paid them for their work at a sufficiently high rate to attract the men you want; to give the position of chief petty officer, which is only obtained by men after long service and approved conduct, to a man on first entry when you know nothing whatever about him, seems rather anomalous.

3202. In appointing engine-room artificers to sea-going ships, do you take into consideration their trade, if you have to send half-a-dozen men to a ship?—As far as we can; but that must always depend upon the number of men we have, the trades to which they belong, and the requirements of the ship. I think that every large ship ought to have a fitter, a boilermaker, and a coppersmith. I may say, indeed, every ship, but every large ship, certainly; and the proportions of the entries ought to be such as to enable us to supply that want. To do that you would have to increase the wages of the coppersmiths very materially, I think.

3203. (*Captain Commerell.*) You have said that you would not reduce the number of engineers; how would you provide for the surplus of engineers that you cannot promote?—By allowing them to retire as they come to an age when they found their chance of promotion hopeless, and allowing them a step in rank on retirement, provided that they had had a certain amount of sea service, and, as I said before, to allow their time for retirement to count from the date of their confirmation. I would also allow them to choose, on retirement, whether they would take the half-pay of the rank they had attained at the time of retirement, or the pay they were entitled to by their service.

3204. Have you considered that that system would entail a very large additional expense upon the retired list?—No, I have not considered that, because I did not consider it my business to do so, or to go beyond the question of efficiency.

3205. You have stated, I think, that you consider 35 the best age for an engineer to be promoted to the rank of chief engineer. We have at present a large number of engineers at the top of the list who are over 40; what retirement would you offer them to go?—I have not gone into that question.

3206. (*The Chairman.*) Do you think that if the engineers of the age of 40 were allowed to go, they would go on the present scale?—I think they ought to have a step in rank, and their time counting from the date of confirmation, and the choice of going upon the half-pay of the rank which they had obtained on retirement, or that which they were entitled to by their service. I cannot at all answer the question

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whether they would go or not. I have not the least idea.

3207. (*Captain Commerell.*) You have stated that you consider we have not too many engineers at present on the list; do not you think in a ship like the "Monarch" or the "Hercules," that if those nine engineers were all highly educated and competent men, that you would really at times have a difficulty in finding employment for them, and that for a portion of them, competent engine-room artificers might be substituted?—Ships like the "Hercules," "Sultan," "Monarch," and most other large ships, have a large number of engines, and a great deal of complicated work, which must of necessity be kept in order out of the sight of the chief engineer, and if you put those things in charge of less qualified men than engineers you must be prepared for accidents happening, and to hold the person who has caused the accident, but who has done his best, entirely blameless; accept it, in fact, that the accident happened through your own want of complement.

3208. Do not you think that an engine-room fitter who has been brought up in the dockyard factory alongside the engineer students for six years, may be just as competent to manage those engines as a young engineer when he first goes to sea, taking into consideration that we have already had it in evidence that many young engineers when they first go to sea have never had an hour's experience in working marine engines?—If the engine-room fitter has been working in the factory and attending the trials of engines and attending to the working of them, then, I think, he would be, but I believe, though not certain, that a very large proportion of the fitters, although perfectly well acquainted with what they are doing, have no idea whatever of driving an engine or taking charge of it, and, I think, the person in charge of an engine ought to have a sufficient knowledge of it to know what is likely to cause injury to it, and how that is to be avoided; that knowledge, I think, is not possessed by fitters in general.

3209. Are you aware that in most of our small ships the engine-room artificers keep the engine-room watch with satisfactory results?—I think they probably do after they have been some time at sea, and the question would then arise whether an improved position ought not to be given to them. My own opinion is, that as soon as you got engine-room artificers into the habit of doing that they would claim the position now occupied by engineers, and would be supported in that claim by all the professional press.

3210. Do you think it would be advisable to send an engineer officer frequently round the manufacturing district, and in connection with the training ships, to examine and select the best men for engine-room artificers?—I think in his rounds he would be obliged to accept the men who offered themselves. I think it is sufficient to make the want known and have every candidate examined provisionally by the chief engineer of the district ship, or if necessary, sent to London, to Somerset House or the Admiralty, or any other depôt where they could be examined by a chief engineer.

3211. Supposing those men were refused, who would pay their expenses?—Their expenses to the district ship, if sent by the recruiting officer, would be paid by the district ship, but they would have to be medically examined before they went there; if they presented themselves to the district ship and were examined both medically and otherwise, they would be sent on here, where, if accepted after a complete examination, of course they are entered; but if not, they are furnished with a pass back to their homes or whence they came. I see no reason why an engineer officer should not go round in that way if it were thought desirable, but I think the object would be equally gained by entering men at the district ships. I think it would be good if the captains of the different steam reserves were authorized to communicate with the captains of the various district ships and recruiting

officer, making known the want, because, in the case I referred to, on advertising that we wanted a certain number, we got a much larger number than we required, and had to stop them. If by a single letter our wants were made known, we should probably get a continuous flow.

3212. Instead of a spasmodic lot?—Yes.

3213. We have had it in evidence that a certain degree of jealousy exists between the engine-room artificers and the chief petty officers, both executive and civil, owing, no doubt, to the different age at which they enter the service, and many other causes, perhaps. Do you think it would be advisable to put the engine-room artificers more completely under the orders of the chief engineer, and let their leave arrangements be more under the influence of their chief?—As far as my own experience goes the engine-room artificer and his leave arrangements are entirely under the chief engineer, from whom he must obtain leave before he can come to the commanding officer. The master-at-arms only enters his name for the purpose of knowing who is out of the ship and submitting the liberty list, with all other chief petty officers to the commanding officer, who is the sole authority for giving leave. So far as I am aware no engine-room artificer or other person in the engine-room leaves the ship without the knowledge of the chief engineer.

3214. Have you any suggestions to offer with regard to the uniform of the engine-room artificers, as they generally complain now of the short jacket?—I think there is a certain amount of reason in their complaint. A short jacket does not look well upon some men, and again their work wears out the seat of their trousers, and a frock-coat would hide that. I think that whatever uniform is given to that class of chief petty officers ought to be given to others, and I see no reason why a man coming straight from the shore should be put in a better position as to rank than a man who has spent some years of his life in the service; perhaps too, when you wanted those men, you would not get them at the wages.

3215. Do not you think, that provided you give the engine-room artificer an increase of pay, it might be as well that he should be prepared to give up any relative rank as chief petty officer, taking into consideration the age at which he enters the service, and the entirely different conditions under which he enters it?—If I were establishing the regulations for the commencement of the engine-room artificers' position, I should enter him by the name of his trade, with a similar rating to that of other masters of a trade, namely, first-class petty officers, and I would depend entirely upon the rate of pay for obtaining them. I believe now that if you materially increase the rate of pay you might obtain that advantage, but it would be at a sacrifice, as I think you are already paying the full market rate of wages of engine-room artificers, with the exception of coppersmiths.

3216. (*Captain Dowell.*) Have you had occasion since you have been in the steam reserve to discharge many engine-room artificers for misconduct or inefficiency?—We have not discharged any, but I submitted the name of one for discharge when I first came here for insubordination and drunkenness, however, he was not discharged, and I am under the impression that the reason was that at that time they could not get any men, and those who were entered by us they sent to other ports. I know of one that was dismissed for insubordination in the Mediterranean, and he got six months' imprisonment; and I know of one that was dismissed at Sheerness for dirty habits; but, I believe, as far as trade requirements were concerned, they were all perfectly good. There is a letter there concerning the one that was sent to prison. I may mention that another engine-room artificer, who was entered at Devonport, has been discharged to my knowledge for leave-breaking for short periods, has now re-entered as a stoker in this reserve. He has been sent to the "Minotaur," and we have lately asked whether he can be re-rated.

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I have submitted that, after a fair probation, he should be.

3217. Since you have been in the steam reserve have any of these men purchased their discharge?—No, none.

3218. (*Mr. Wright.*) Have you observed any reluctance upon the part of the engineers and assistant-engineers to be employed in manual labour, that is to say, in doing repairs either afloat or ashore?—In one or two cases afloat I have found that the chief engineer complained of a certain reluctance on their part in that respect, but he having made it perfectly clear that he intended the necessary work to be done, and that I intended to support him, there was never any more difficulty. While in China from 1864 to 1867 one or two cases of the kind came under my notice through a court of inquiry.

3219. Do you think it is proper to employ commissioned officers in an ordinary way in doing the manual labour of repairs. I do not mean in cases of emergency, but in the ordinary way?—I take it that in a general way every officer must do that work which he is capable of doing, whenever it may be required. I should not, as a matter of choice, sanction a commissioned officer being put to do any manual work when the same work could be done by the engine-room artificers on the ship, and the junior engineers should of course be the first called on for manual work, the seniors superintending.

3220. If you retained the same number of engineers on board our large ships that you have at present, you would then require to employ them largely in doing repairs, or have to enter a larger number of engine-room artificers?—Yes.

3221. You would still keep up the condition of employing them largely in doing repairs?—That must be taken into consideration when they enter the service.

3222. In large ships like the "Sultan," where they have nine engineers, and are able to have three in a watch, do not you think that some of them might be dispensed with, and engine-room artificers substituted in their place?—I am doubtful, as a rule, whether you could put three on a watch. One is generally occupied in drawing plans and other office work, for the chief engineer; one is pretty well occupied with the double bottoms, and then the senior is generally occupied in general directions, under the chief engineer, whom, I think, requires such assistance; therefore, I believe it practically comes to this, that there are two only on watch. A chief engineer accustomed to charge would probably be able to give an opinion on this point as to the assistance necessary.

3223. Is it your opinion generally that we could not reduce the number of engineers on board ship at present?—I do not think you could reduce them much; to a small extent you might; any remedy must be looked for in the opposite direction, by giving good retirement, and making vacancies in that way; of course in saying that, I am not considering the expense.

3224. (*Mr. Covey.*) With regard to the engine-room artificers, you said that you thought that relative rank would not be such a great inducement to them as increase of pay; do not you think that the increase of pension which they would get, if made warrant officers, would satisfy them?—I think that not getting a pension now, beyond that which chief petty officers get, is very much the cause of complaint, and I think probably that might affect them, but I do not think that many when they first enter would consider the pension very much. I think the principal inducement that brings the men to us is the permanence of employment. I find that in talking to some that come down, that many of the advantages which used to be held out to men coming into the navy, are entirely forestalled by clubs; for instance, you used to be able to tell a man "If you are sick you will get assistance, and you will get your pay," but the answer now is "Yes, but in my own employment, if sick, the club doctor attends us, and

the club makes up our wages," therefore the only advantage that a man now gets in the navy over private employment is, getting a certain amount of leave, his time counting, and his pension.

3225. We have had in evidence just now, that the pension was a great inducement to the man?—Yes, it was.

3226. (*The Chairman.*) In the case of the trades' union which you just referred to, have not the men got to pay for the advantages they receive out of their wages?—Yes.

3227. So much a-week?—Yes.

3228. Are you aware that they do not quite, when out of employment and sick, make up their pay to them, but allow them only 8s. a-week?—That is a small amount, but I believe it varies according to the different societies to which the men belong, but I have no means of knowing how that is.

3229. You stated that you thought it would be desirable to enter these engine-room artificers as petty officers, with the ratings of the heads of the departments which they are in; if you did so would you still put them in the chief petty officers' mess?—No. I would put them in the petty officers' mess, and make the privileges go with the relative rank.

3230. If these men now seriously object, as they do, to being in a mess with the executive chief petty officers, would they not much more object to being in a mess with the petty officers, leading stokers, and others?—I do not think they would. I think that the new-comers regard the chief petty officers who wear the dress of a blue jacket, as being very much in the same position as a blue jacket.

3231. In that case, if in the petty officers' mess, they would have no doubt to clean their own mess?—They would have a boy to clean it out.

3232. And do the same as the other petty officers?—Yes; and I think that is what ought to be required; the payment question must follow. I believe if the master-at-arms was one of the mess, it could be arranged without any squabbling at all.

3233. Do you think that if you make a change in the pay of the different trades, that you might on certain occasions, if you enter a man who is a highly cultivated man from the factory and receiving good pay there, enter him at a higher rate at once, instead of insisting on his going through the lower grades?—I do not think that system would be better, because you must carry it out and reduce the pay of those who are not so well up. I believe myself, also, that the engine-room artificers whom we are now getting, are very much improved from what they were a few years ago as workmen. I think it is exceedingly probable that the men we have who receive 38s. a-week, could go into the market and get equally good wages.

3234. Do you think it is desirable to make a progressive increase in the wages of engine-room artificers; at the present they stand, as you know, at 5s. 9d. per day, after three years service?—I think the present rate of wage is perfectly sufficient for the first 10 years; I should like to see a small increase on re-entering for the second 10 years, but I consider most decidedly that that requires to be carried out throughout the whole service. I think, with other classes the rates should be progressive after that, and a further increase after 15 years; an engine-room artificer, receiving, as he does now, so nearly the market rate, a small increase after 10 years would be sufficient.

3235. Do you think that many of the engine-room artificers now in the service will re-enter at the end of 10 years with their present rate of pay?—I have no means of knowing that, but my present impression is, that they will.

3236. Are you aware whether any have?—I do not think that the rating has been long enough established. Oh, yes; a man named Bateman has re-entered. In the case of engine-room artificers and stokers and other men entering from the shore, they cannot, under the present arrangements, receive any money until a

certain date; this necessitates their getting their clothes on their own responsibility from outfitters in the town, who make them pay largely for the accommodation, and very probably in many instances give them bad material. I would suggest that the men on entry should be allowed to get such clothes from the paymaster, if they desire it, and still to draw a portion of their pay for remittance to their family, thus making the debt run over a longer period.

3237. Do you think that, if the engine-room artificer were allowed to wear a tunic or some-

thing in the shape of a pea-jacket, that it would be a satisfactory compromise between a jacket and a frock-coat?—My own opinion is that a seaman's jacket should be sufficiently long to act as a covering for his hips, fitting the body; and that the monkey-jacket of an officer should be the same only with distinguishing marks; this would enable a man to have his mustering jacket of good material, which would be a useful and warm jacket for him when no longer sufficiently good for parade purposes. I think this should apply to seamen of all classes, as well as to engine-room artificers.

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(The witness withdrew)

ALBERT JOHN DURSTON, Esq., R.N., called and examined.

3238. (The Chairman.) You are, I believe, assistant to the chief engineer at this dockyard?—I am.

3239. Have you had considerable experience in the training of engineer students?—Yes, for the last three years.

3240. If it be found desirable to enter the engineer students from a higher social class than at present, are there any modifications in their position and training in the dockyard which you would recommend or suggest to the Committee?—I have a few which I think it would be advisable to adopt, or which would be beneficial; in the first place, I would only enter them between the ages of 15 and 16, or say, between 14 and 16; they are more set then, and 16 is not too old an age for a boy to begin his training; secondly, they should not pick up tickets as they do at present; at present they enter the dockyard on the same standing as the workmen, that is, they have to pick up tickets on going in, and deposit them on leaving the yard; they should, I think, sign an attendance book and be allowed a few minutes' grace on entering the yard; the draughtsmen and leading men all do that.

3241. (Captain Commerell.) That recommendation would be provided we get a different class, I suppose?—Yes; or even if you get the same class, I think that would be for the improvement of the present class; I think also, it would be an advantage if an officer were appointed specially to look after them, that is, after their training, and report upon them monthly, to watch them through every shop, and every trade they were concerned in throughout their training, that officer to be in addition to the leading man who would instruct them in the use of their tools.

3242. (The Chairman.) To be under the chief engineer of the dockyard?—Yes, of course, under the chief engineer of the dockyard. I would also propose to do away with the evening work. At present, they have to attend the dockyard school two evenings, and attend a lecture on a third each week; if they do not do that, they attend drawing class; and I think to be at work all day, and then again in the evening is too much. The evening is a broken time with them, and it is a time in which they could employ themselves more advantageously at home. Instead of giving them broken days at school, as is now done, I would propose two consecutive whole days in each week at school, as they could get through a large quantity of work in that time. Another thing I think is, that they should all of them from first entry, keep a diary, to be written up in their own time of an evening, which they should show to the officer who was concerned in their training every month, or as often as he wished it. This would cause them to observe many things, that they would otherwise not take much notice of, and it would also make them apt at describing the work in which they were employed, or anything which they might come across in the shops. They should also make rough hand sketches in their diaries from memory, or one or two

of them might occasionally be allowed to take a few sketches of any piece of machinery in the shop.

3243. They have that opportunity at present, have they not?—Occasionally, when afloat, but not right through. I see that in the subjects of their examination for entry into the dockyard, there are no marks given for history; it does not now form one of the subjects of examination, but it should be given. With regard to arithmetic, instead of putting them a few difficult questions in the arithmetic paper, there might with advantage be inserted some in simple mensuration, as it is a subject they ought to know; the translation of English into French I would also insert. After they come into the dockyard I think the examination in general educational subjects, except in mathematics, mechanics, physics, and practical sciences should be done away with, and they should not be any longer examined in those things, it is too much a tax upon them to be always looking up grammar, history, geography, and so on, and if they passed a good educational test at the age of 16, I think that would be sufficient, in general subjects at least, the rest of their time in the dockyard should be devoted to learning subjects especially applicable to their profession.

3244. (Captain Commerell.) If they let those subjects fade from their memories, how would they get on at Greenwich when they went there?—Their final examination at the dockyard includes history and geography, but I do not think it should, I think a boy at 16 years of age has learnt as much of them as he needs, and anything more is not necessary.

3245. It is, in your opinion, of no practical use to him?—No, but he ought to keep his knowledge up as a matter of course.

3246. (The Chairman.) As a matter of reading?—Yes. With regard to the division in the fourth year of the students amongst the different shops, as mentioned in the circular of the 13th May, 1873. The third article says, that "during the fourth year they are to be employed for about three months in the coppersmiths' shop, three months in the iron and brass foundries, three months in the boiler shop and engine and boiler smitheries, and the remainder of the time in the erecting shop." I think those twelve months might be of more advantage to them if they had three months in the pattern shop two months each in the foundries, coppersmiths' shop, and smithery, and three months in the boiler shop; that would include the pattern shop to which, under the present regulations, they do not go.

3247. (Captain Commerell.) They have no sort of experience in the pattern shop at all?—Not since the issue of the above circular.

3248. (The Chairman.) For moulding?—For making patterns for mouldings, it is useful in case of an accident to the machinery to be able to make a pattern of any casting that may be required.

3249. It is a high description of joiners' work, is it not?—It is superior to joiners' work. Then the same

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circular says, "During the fifth year they are to be employed about six months in the erecting shop, and about six months on the hulls of iron ships." I should propose that it should be six months on the hulls of iron ships, and six months afloat, discretion being given to send them into the erecting shop at such times as the jobs on which they are employed when afloat, or a portion of those jobs, might be in the erecting shop. Supposing a student was employed while refitting a pair of engines on board ship, he could then be sent into the erecting shop, provided they had there any jobs connected with that duty, or at any time that it might be advantageous to send him there, and not that he should be employed there for six months' whatever might be the work in the shop.

3250. How would you employ him for the six months afloat?—They should be assisting in the repairs of ships afloat.

3251. (*Mr. Wright.*) You mean to say that there is so little erecting to do generally, that there is not profitable employment for them?—Just so. Article seven says: "In passing the students through the several workshops, it is to be understood that they are to be distributed in such numbers at various times, and to be employed on such pieces of work as will be most conducive to the general efficiency of the several departments." That makes them subservient to the efficiency of the department, they should, I think, be employed on such jobs as would be most beneficial to themselves, or to their good training.

3252. Do you think it is possible, having regard to the efficient working of the factory or of the dockyard, to make the work subservient to the training of the students without injury?—You could give them work to do without incurring much expense; it need not necessarily be the work required to be done by the department, and yet it would teach them their duty properly.

3253. Would it not be liable to confuse the accounts of a shop and to throw out the economical working of it, if they had to find special work for the students instead of them doing the work that was required?—It need not, if it could be arranged. I think that the time of the students should not be charged to any work at all on conversions; now of course the cost of their labour on a job is given, the same as a workman's is.

3254. You would wish to see the work of the students kept in an entirely separate account from the work of the dockyard?—Yes; it could be kept separate from any conversion accounts; clause 8 would be entirely altered if the proposal I make were carried out, that is, with regard to doing away with the evening work for the students. It says now, that "During the first three years the engineer students are to attend the dockyard schools on two afternoons and three evenings each week. During the fourth year they are to attend the schools for two afternoons as before, but on the three evenings they are to attend drawing classes, where they will be taught mechanical drawing under the superintendence of the leading draughtsman. During the fifth and sixth years they are to attend the schools during the three evenings each week, but they are not to attend the schools in the afternoons, as the whole time during the working hours of the yard is to be given to practical studies."

3255. What alteration would you suggest in that?—I think I said just now that I would do away with the evening work altogether.

3256. When would you have drawing classes?—If they kept a diary during their whole time, they would learn to sketch and draw sufficiently to answer all practical purposes, and they could finish off their drawing in the last three months of their time in the drawing office, which would be much better than being employed in the evenings.

3257. (*The Chairman.*) Has it ever occurred to you that it might be advantageous to allow the engineer students to reside and mess in the dockyard, if it were

possible?—Yes; I think that would be attended with advantage, if the expense were not too great.

3258. For them or for the service?—For the Admiralty, I mean.

3259. (*Captain Commerell.*) Do you find that there is much clashing between the ordinary workmen in the factory and the students, or do you think there is any jealousy in the workshop?—No, I could not say that; I do not think that they suffer from any feeling on the part of the workmen.

3260. Do you think that there is any jealousy of them anywhere?—There is only one place in which we have an impression that that has existed, and that is in the fitting shop, in which the trade boys, who are the sons of the workmen, are brought up; in that case we think that the men lean as a matter of course to their own sons, in preference to the students, and look out that they have better work.

3261. (*Captain Dowell.*) Some of the students are the sons of the same men?—Yes, some of them are. I think the idea with the workmen is that the students do not require to know their work so well as the trade boys. They know that the trade boys will have to earn their livings at it, but the students will not.

3262. (*Captain Commerell.*) Do you think that the practical education which the students get in the fitting shop is altogether satisfactory?—I think it might be improved if there were an officer appointed as I suggested to look after them specially, who had nothing else but that to do; that would give the students themselves a higher status in the shops, and from his own position he would be able to direct or to see that they had suitable work.

3263. Do not you think that would clash in any way with the ordinary work of the fitting shop?—Not at all, if he were an assistant to the chief engineer.

3264. On speaking to a student this afternoon he informed me that he had been in the erecting shop for three months, and he had only had three jobs of work given to him; can you give me any explanation of that statement, or say whether it is often likely to occur, or whether, in your opinion, he was speaking the truth?—He may have been employed on only three jobs of work; during the time between finishing the first job and commencing the second he was perhaps set to do something else which he has not called a job of work, because he has not charged time for it, either to make tools for himself, i.e., to make squares or callipers, or trying to shape a square and fit it to a socket; to fit a hexagon in the same manner; to cut a key-way in a piece of iron, and so on. I imagine that what he meant by having only three jobs, was three jobs for the benefit of the service; the rest of the time he was employed in his own instruction.

3265. Do you find that the general run of engineer students are of that physique that you would like to see?—I think that those who recently went to Greenwich are of good physique, but I notice that some young lads in the factory are rather small; if we entered them at a later age it would be better; those who recently went to Greenwich entered at the age of between 15 and 16, which I propose as the age now.

3266. Do you think that if the engineer students during the last year of their time were employed in driving marine engines in order to gain experience, it would be of any use to them?—They have an opportunity of seeing large engines driven, and they do take part in the driving of large engines to a certain extent; they attend trial trips; we have some of them on every trial trip that takes place in ships that have been repaired by the factory, and on what we call factory trials of ships, they have to manipulate the engines or to assist in the manipulation of them.

3267. We had it in evidence the other day from an engineer that he never had worked an engine on board a man-of-war, and he regretted very much that he had never had an opportunity of gaining experience in it?—That might happen in some cases, but if he

kept his eyes about him I do not see that he would suffer much by that; he would surely be in the engine-room during a period of his apprenticeship or studentship, and he ought to have made himself acquainted with the working then.

3268. (*Mr. Wright.*) Did I understand you to say that you would dispense with the attendance of the students at school in the evenings?—Yes.

3269. Would you leave them to their own devices in the evening, and let them have all that time to themselves?—Yes.

3270. Do not you think that, being a lot of young lads, they might get into bad habits?—They pick up bad habits now in attending school late in the evening.

3271. But would it not be worse if they did not have so much schooling?—I think, if actuated by a desire to improve themselves, they would make use of their evenings profitably.

3272. Do you think that the present mode of training is too hard work for them?—Yes. I think that the evening work especially is more of an annoyance than a benefit to them; they come down to school for a short period in the evening, during which time they can do but very little work; and the late head-schoolmaster, Mr. Rawson, has expressed the same opinion many times. I think that if they had two whole days a week, as I have suggested, they would get through much more work.

3273. A suggestion has been made that the students should get occasionally of an evening a lecture on the theory of the steam engine. Could you yourself give these lectures occasionally?—Yes.

3274. Of course that is to say if an arrangement were made for the purpose?—Yes, quite so.

3275. They do not get any instruction in the steam engine at present in the dockyard, do they?—Occasionally I send for some of the elder ones to come to my room, and I ask them questions relative to the work upon which they are employed, and sometimes take a few theoretical questions at the same time. I think if an officer were appointed specially to look after them, it would be all that is required.

3276. You think that the system of having a leading man to look after them does not work well?—I think there should be an officer in addition. I would still retain the leading man, but an officer would be better able to impart knowledge to them than a leading man.

3277. (*Mr. Covey.*) Do you think that if a better class of students were entered they would be more able to command respect, and would be better looked after?—I do not think that would make any difference to the men, and they would not attend to them any more.

3278. Do not you think that the leading man would have more respect for them, and would look after them better?—Not at all. It is a matter for the officer to see that he looks after them properly.

3279. (*The Chairman.*) You said just now that you would dispense with the instruction in drawing during their fourth year; how would you expect them to obtain instruction in mechanical drawing?—If they kept a diary, as I suggest, they would learn to sketch, and, if necessary, they should pay for instruction in drawing outside; it is not an expensive thing to learn.

3280. If we consider it necessary for them to learn it?—They are in the drawing office for three months of their time.

3281. They are there to draw, and not to be instructed; it is the instruction that seems to me to be so valuable?—While they are employed in the drawing office for that three months, they would perfect what they might know. It used to work well many years ago, under the old system of engineer and factory boys; they were generally employed in

the drawing office for the last six months of their time, and before they went there, they were made to bring up a drawing as evidence of what they could do.

3282. Do you ever find that an intelligent engineer student of four or five years' standing, is as good a practical workman as some of the less intelligent engineer students of six years' standing?—As far as the workmanship is concerned, he would be; but then he has not had an opportunity in his four years of going afloat to pick up his practical engineering. He would learn his workmanship in the fitting shop.

3283. He has not had an opportunity of picking up knowledge in the repairs of engines?—No; nor with the general arrangement of engines; he acquires that knowledge on board ship.

3284. Would you, under any circumstances of a student being able to pass the final examination at five years, allow him to gain a year's time by passing into Greenwich, supposing he passed in his practical and theoretical examination; or do you think it would act as a stimulus for them to work?—It would, if we could arrange for the practical examination properly.

3285. They should pass everything that they have got to pass?—The practical examination would have to be carefully watched, and some arrangement would have to be made to give them a longer time afloat than is the case under the present arrangements.

3286. When you say "afloat," you mean in the repair of the engines on board ship?—Yes.

3287. At present is there any report when an engineer student passes his final examination, as to his qualifications in his manual and practical work?—A certificate is made out in accordance with this form (*producing the same*).

3288. There is only one class of certificate given on their final examination and leaving the dockyard?—That is all.

3289. Do you think it would be advisable that a report on his skill as a workman, when he finally passes into the navy, should be given, we will say, in such terms as "very good," "good," "fair," "indifferent," or "bad"?—Yes.

3290. At present they take their standing by the combined marks which they get for practical engineering and educationally?—Yes.

3291. Do you think it would be advisable that their skill as workmen should have any effect upon the standing which they take on entering the navy?—Yes.

3292. You think it would act as a stimulus to them in their practical work?—Certainly, I thought possibly that the certificate might be divided into three parts, one for workmanship, the second for engineering, practical and theoretical, and the third for mathematical knowledge and a knowledge of practical sciences.

3293. (*Captain Dowell.*) There is a lecture on Wednesday evenings which the boys of over four years' standing attend, what is the subject of that lecture?—Generally, I believe chemistry, but it may include electricity and magnetism.

3294. Have they any theoretical instruction in the steam engine?—They have no lectures upon it; I think it might be a stimulus to engineer students if a portion of the appointments to the navy were offered to artied pupils in the outside trade.

3295. (*The Chairman.*) On the understanding that they passed a similar examination to that which our own students pass on entering the navy?—Yes.

3296. (*Captain Dowell.*) Do you think that the men entering in that way would be of the social class that our future engineer students will be?—Yes, if they were artied pupils they would be.

3297. (*Captain Commerell.*) I suppose they are very particular when they take artied pupils?—Yes, I presume so from what I have heard, there is usually a large sum of money paid with them, and that generally carries with it a certain amount of respectability, and so on.

A. J. Durston,
Esq., R.N.

27 Oct., 1875.

(*The witness withdrew.*)

[Adjourned to to-morrow at 10 o'clock.]

THURSDAY, 28TH OCTOBER, 1875.

PRESENT :

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

WILLIAM ROBERT TRIM, called and examined.

- W. R. Trim. 3298. (*The Chairman.*) What position are you holding?—I am a fitter in the dockyard.
- 28 Oct., 1875. 3299. What pay are you receiving?—36s. a-week.
3300. How long have you been in the dockyard?—This time about two years.
3301. Where were you before then?—In the yard previous to my going into the navy.
3302. Were you in the navy as an engine room artificer?—Yes.
3303. How long were you in the navy as an engine-room artificer?—I think not quite six months.
3304. Did you go to sea as an artificer?—Yes.
3305. In what ship?—The "Resistance," and in the "Caledonia" for a short time.
3306. In those two ships only 6 months altogether?—Yes.
3307. Were you in the reserve at all?—Only for about two days.
3308. Where were you before you joined the navy?—In the dockyard here.
3309. In the factory?—Yes.
3310. As what?—As a fitter.
3311. How long were you in the dockyard then?—I think about three years, or it might be a little over.
3312. Where did you serve your time?—At Messrs. Spencer and Brownings, High-street, Portsmouth.
3313. Optical instrument makers?—Opticians and engineers, they are only opticians now, but they were engineers as well then.
3314. What class of engineers?—They made stationary engines.
3315. Constructing or repairing engines?—Both.
3316. Where is the workshop?—In Penny-street.
3317. How long did you serve with them?—About six years.
3318. And after you had completed your time, where did you go to?—I went to the Ordnance Gun Wharf.
3319. What duty did you do there?—I was employed there as a fitter.
3320. A fitter of what description of work, on marine work?—On the ordinary ordnance work there, and in the repairing of guns, carriages, and the fittings attached to the guns.
3321. The sights and that sort of work?—Yes.
3322. What wages did you get at the gun wharf?—6d. an hour there.
3323. Were you obliged to work for a certain number of hours?—56 hours a-week is the table there.
3324. 28s. a-week?—Yes.
3325. Did you get any overtime?—Very seldom in the gun wharf.
3326. Did you come from there direct to the factory?—Yes.
3327. What pay did you get when you first entered the factory?—30s. a-week.
3328. What induced you to enter the navy as an engine-room artificer?—I thought it was a different job from what I found it to be.
3329. What sort of a job did you think it would be?—I thought it was a job worth leaving the docks to go and take, but I found my mistake out afterwards.
3330. What pay does an engine-room artificer get at sea?—5s. a-day, 35s. a-week.
3331. When was your pay raised to 36s. a-week in the dockyard; did you have that pay before you left to join the navy?—No, 34s. a-week when I left.
3332. Did you think that 35s. a-week at sea was better than 34s. a-week on shore?—I thought so at the time before I went to sea.
3333. What advantages did you think you would derive besides the pay?—I thought there was a pension attached to it, and other privileges which would make the job better than would be the case by my stopping in the yard where there was nothing particular to look forward to; that was the thing that induced me as much as anything to go into the navy.
3334. Why did not you stay there after you entered?—I found it quite different when I got there.
3335. In what way?—When I saw the regulations at the steam reserve office, they stated that I was entitled to mess with the master-at-arms, the writer, and the schoolmaster, and when I got on board the ship, or was drafted in, I found out that it was no such thing, but I had to mess in the best manner I could along with the blue jackets or anybody else.
3336. In what ship was that?—In the "Resistance." I went on the quarter-deck and saw the commander, and I got nothing there, the master-at-arms said there was no room for me in his mess, and I had to go by that and to do the best I could.
3337. Are you sure it was specified in the steam reserve office that you would mess with the master-at-arms, writer, schoolmaster and ship steward?—I saw that specified in the printed form; it said the schoolmaster, writer, master-at-arms, and other chief petty officers, those are the words. When I told the commander that, the paymaster brought the regulations up and he found that what I had told him was quite correct.
3338. Were there other engine room artificers in the ship besides yourself?—Yes, one supernumerary.
3339. You were the only one of the complement?—I was the only one that belonged to the ship, the other one was in the ship previous to my going there, and he was messing in the blue jackets' mess.
3340. Was that a mess with the chief petty officers?—The blue jacket petty officers.
3341. Do you know whether he did mess with the chief petty officers?—I know he was messing in the blue jackets' mess; of course I was ignorant of

the navy, but I known it was the blue jackets' mess that he was in.

3342. You do not know whether it was among the chief petty officers or not?—I do not think it was.

3343. Do you know where the chief petty officers messed in that ship?—I do not know whether there were any besides the writer, schoolmaster, and master-at-arms.

3344. Was the "Resistance" a seagoing ship?—A coastguard ship. We were under way with the pensioners at the time.

3345. Do you remember in what year that was?—It was three years ago, in August, 1872.

3346. When you entered the navy did you make any inquiry as to who were the chief petty officers in the ship?—As far as I can recollect the form which I read, it was as I stated; that form is in the steam reserve office now, and I think you will find that what I say is quite correct.

3347. Do you consider then that the writer and schoolmaster are superior to the chief petty officers of the navy?—I do not know about their being superior, but they hold a more respectable position I should think.

3348. Was your only objection that you were not allowed to mess with the writer and schoolmaster?—That was one great objection.

3349. What was another?—There was another thing, which was this—when I went to the "Asia" they gave me a sized chest there which was a great nuisance to me after I got drafted; it was 2 ft. by 3 ft. 4 in., and when I got on board the "Resistance," I had not belonged to the service more than 14 days before I had orders to get another chest, because that was not of the regulation size. I told the commander that that was the size given me in the reserve ship, and I had a great deal to go through in consequence of that. I was put into the ship's corporal's mess, when the mess was only large enough for themselves without any other man being with them, and we used to find the victuals all mixed up together, and the provisions all anyhow when we got there, and we never could depend upon getting a meal; we had a boy from the deck to attend to us, but very seldom when we came off duty could we make sure of getting a meal because that boy had his deck work to do as well as to attend to us.

3350. Did you expect when you joined the service that you would have a servant to attend to you?—It stated in the rules which I read, I think, that one or two chief petty officers would have one boy, and four or more, two boys; and I naturally expected that we should have someone to attend to us; it was impossible, when at watch in the engine-room or stokehold, that we could go and look after ourselves, or keep the mess clean or do anything of that sort.

3351. Was your work for a great many more hours a-day than the stokers or leading stokers?—No, I do not know that the hours of work were anything out of the way; in fact, it was about the only comfortable part of my time when I had something to go to, to keep off the deck; there was no comfort there.

3352. Was everybody else in the ship uncomfortable?—There was only me and the other supernumerary as engine-room artificer, but he was quite as uncomfortable as I was.

3353. Were all the seamen in the ship uncomfortable?—I do not know that they were.

3354. Do you suppose that you could not get accustomed to their life in a year or two?—They had a proper place to go to, and the stokers had a nice mess and wash berth where they could go and wash themselves, whereas I, when I came off watch, had to wait till the last stoker had washed himself, or go and fetch a bucket and get my own water; if I did not do that I must wash in their dirty water.

3355. Why would not you take the first turn?—They had a wash berth there, and it would be doing them out of their privilege.

3356. Was there any other cause that prevented

you liking the service?—No; of course that was a continual thing while I was there, and I got thoroughly disgusted with it, and of course I went in for my discharge.

3357. Did you purchase it?—Yes.

3358. What did you give for it?—£12.

3359. Are you a married man?—Yes.

3360. Do you belong to a trades union?—Yes.

3361. Did you while at sea belong to it?—Yes.

3362. If you had to advise others, or any of your friends, to go into the service or not, or if you wished a friend of yours to go into the service as an engine-room artificer, what point would you wish to have altered as regards their pay and position?—I would not advise a man to go into the service at present at all, that is if I called him a friend.

3363. What you wish to have altered?—The first thing I would wish to have altered, if I were going into the service myself, would be to be put out of the power of the master-at-arms altogether, because he is a great torment to all the engine-room artificers in the navy.

3364. You mean, to be under the chief engineer alone?—Yes, to be under the chief engineer alone.

3365. In what way was the master-at-arms a torment?—Because he was always interfering with the engine-room artificers. I do not know exactly in what way, but he always found some way to be a torment to me.

3366. Do you mean with regard to keeping your mess clean?—Not only with regard to keeping the mess clean, but he was always finding fault in paltry ways, and stopping the men from going ashore, when they had permission from the chief engineer; he wanted them to fall in with the liberty men, and all such games as that.

3367. Do not you think that when in the service, you must comply with the rules of the service, why should you be exempt?—Of course you are expected to comply with the rules of the service, but for a ship's corporal, or master-at-arms, who are little better than labourers, to be a torment to men who have served their time at a trade is too much; one is almost like a dog under him, and it goes very hard upon a man; it might do very well for a young man who had been brought up in the navy, but it will not do for a man who has served his time as a mechanic, and has got a trade at his finger's ends, which he can get his living at.

3368. Why should a young man who has been brought up in the navy, and who has served his country, be treated in a different way to a man who is working on shore?—He has been broken into it.

3369. And you do not think you could be broken into it?—Not by the master-at-arms; I should not like to be curred down like that; if it was by anyone above me it would be a different thing. I knew when I joined the service, that I should have to obey all orders from the chief engineer, but I did not think I should have to obey the orders of the master-at-arms and the ship's corporal, and the likes of those fellows.

3370. Do not you think that you ought to have made some inquiries?—I thought I had.

3371. But evidently you had not?—I had not as far as that was concerned. Then as regards the pension, I was informed when I joined the navy that the pension would amount to about £75 a-year.

3372. Who told you that?—I was given to understand that at the reserve office; I do not know the gentleman's name, but there were several; they said they imagined it would amount to about £75 a-year, but as there was no regulation out for it, they could not say positively; there is no provision made for a man's widow.

3373. Have you any provision made for your widow by the trades union?—I do not know how it is if a man lost his life while doing his work; I do not know if the widow would get anything.

3374. Do you get any pension in the dockyard?—Not as a hired man. I do not know whether the

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widow of a man who lost his life during his work would get anything. A shipwright might leave this dockyard, and if he went into the navy he would go into the carpenter's crew and become a warrant officer; as soon as that takes place he gets a good pension for himself, his widow and children; while we, who reckon ourselves to be the leading trade, do not. I think it would be a great inducement to get good men to join the service if there was something of that kind provided for the widow afterwards; under the present system I cannot see that there is anything to induce men who can get a living outside to go into the service.

3375. Do not you think that permanent employment is sought after?—Yes; but a steady good man can get work anywhere if he understands his work and gets known; his character will take him anywhere, that is my opinion; and the likes of the men who go into the navy and stop there under the present scale are men who are frightened to go anywhere else, they are frightened if they leave they will not be able to get work anywhere else.

3376. From all the evidence we have received it appears that the engine-room artificers in the service are a remarkably good set of men?—Yes, but I believe you would get better men if they had a better position given them.

3377. What pay do you think ought to be given to induce them to go to sea?—The average pay now is about 37s. a-week outside, and we have got liberty and can enjoy ourselves at home in the evening; on board ship of course there is nothing of that sort. I should think myself that if the engine-room artificers were to start from 6s. to 6s. 6d. or 7s. a-day, or something like that, and have a first and second class, it would do.

3378. According to length of service?—According to ability; let them pass an examination for it; if they were only half-qualified let them have a second class, and if qualified for a first class position let them take it. At the present time there are blacksmiths, boilermakers and coppersmiths who are engine-room artificers in the service; now it is a great advantage to them to come out of a shop where they are getting 18s. or 24s. a-week, and go into the service, and get 5s. a-day for 7 days a-week, but a fitter in a private firm would get more money than they get in the navy.

3379. Are you aware that there are hardly any boilermakers employed in the dockyard under 30s. a-week?—Plenty, I should think, but I do not know much about the boilermakers in the yard; of course a good boilermaker does not care to throw it up; a man who is getting the average pay that they get in the navy would not be the man that would go.

3380. Why are the boilermakers in the factory the men so anxious to come?—Perhaps they are young fellows just out of their time, and think it a very good start for them.

3381. (Captain Dowell.) You said that you thought the engine-room artificers ought to start at 6s. or 7s. a-day, to what would you expect they should rise?—To 8s. 6d. or 9s. a-day at the finish. I do not think that would be any too much for them according to the work which is allotted to them.

3382. Do you think it would be any inducement for engine-room artificers to enter if they had that good pay of from 7s. to 9s. a-day, and had no rank?—I would rather join like that if I were going to join again. I would rather do without the rank altogether, so long as there was comfort and pay with it.

3383. Have you any objection to the uniform you had to wear?—As far as I am concerned I should think that the dress of a merchant engineer would do, it would be quite equal to any uniform.

3384. What is that?—A plain working dress, a blue working dress, and just a decent uniform when they go ashore, just some sort of regulation uniform, but nothing expensive about it.

3385. That is what it is at present in the navy?—

At present it is rather an expensive uniform according to the grant that the Admiralty give to buy it.

3386. It is only a plain jacket with brass buttons and a cap and badge?—My outfit cost me about £20, and I had £2 9s. 4d. clothing money allowed to me to pay for it, or something like that.

3387. Have you ever served in any other ship but the "Resistance"?—I was turned over to the "Caledonia" on the same station.

3388. (Captain Commerell.) Did you ever represent to the chief-engineer how uncomfortable you were in the mess place?—Yes.

3389. Who was he?—Mr. Williams was chief-engineer of the "Resistance," and Mr. Campion of the "Caledonia." When we got to the "Caledonia" there was a little more comfort. We had to complain so much in the "Resistance" that in the "Caledonia" they thought they would find us a little more comfortable position, and they gave us a mess right forward, which was more comfortable.

3390. With whom did you mess?—I was messed with the two writers and the schoolmaster, and we had a boy to attend to us, but in the "Resistance" we had nothing of the sort.

3391. The master-at-arms always messed separately?—Yes, and the ship's steward, they messed by themselves in the "Caledonia."

3392. Supposing you went to sea again, would you prefer messing generally with the whole of the chief petty officers or by yourselves?—By ourselves, I should certainly say.

3393. What is your objection to messing with all the chief petty officers, including the master-at-arms?—As far as I know about the other chief petty officers, I found them very nice men to mess with, that is the writer and schoolmaster, it was only the master-at-arms that was objectional; not only me but the other chief petty officers were at loggerheads with him, because he was a man that would interfere.

3394. You would sooner mess by yourselves?—Yes.

3395. Which would you rather have, the rank of a chief petty officer, with all the privileges attaching to it, or give up rank altogether, and be placed exclusively under the chief engineer?—I would rather be placed exclusively under the chief engineer, without any rank at all; I think it would be much better, and things would go a great deal smoother.

3396. If that were the case, how would you expect to go on shore, from whom would you get your leave?—I think if I asked either the chief or the senior engineer and they gave me permission and the captain had no objection, nobody else has any business to stop me, and nothing else should be necessary beyond letting the master-at-arms know that we were out of the ship, or were going to be absent from the ship for a time; it should not be for him to have it in his power to say "you are not to go till the liberty men go," and then have to be mustered with them on the quarter-deck.

3397. Are you aware that the master-at-arms is only the mouthpiece of the commander?—From what I saw of our master-at-arms I should think he was very near captain, he did very much as he liked, I think.

3398. You mentioned that you consider that boilermakers and smiths were very glad to come into the service at the present rate of pay?—No, I did not say that they were very glad.

3399. But that there was no difficulty in getting them at the present rate of pay?—Not much difficulty in getting boilermakers and blacksmiths, they come out of shoeing shops and those sort of places.

3400. Have you seen that the artificer smiths have been superior to the ordinary blacksmiths of the ship?—No, I have not, we had not got one in the ship I was in; we had a boilermaker, but I am quite positive he was not a superior man to some of the boilermakers, because when he had work to do in

the engine-room he came to me to show him where it was and how to do it.

3401. (*Captain Dowell.*) In connection with the boilers?—In the engine-room when it was his watch below; he was a man who called himself senior to me in the navy.

3402. (*Captain Commerell.*) Were you an acting engine-room artificer or confirmed?—I was an acting engine-room artificer.

3403. Was the boiler-maker an acting engine-room artificer?—I do not know whether he was confirmed or not, but he was senior to me.

3404. How long had he been in the service?—I do not know; he has lost his eye, and I know he is out of it now, John Stephenson was his name, he served his time in the factory.

3405. Could you take charge of an engine-room?—I fancy I could.

3406. Have you ever driven a marine engine?—I have been out steaming a great many times, but of course I never had an opportunity of taking the whole charge, though I fancy that I am competent to do so.

3407. Do you think that the majority of engine-room fitters could take charge of the engine-room in small ships 6 months after going to sea?—I do not see why they should not be able. If a fitter understood fitting the practical parts of an engine, he ought to be able to take charge of it. If he could not do so I should not call him a first class man.

3408. (*The Chairman.*) With regard to the boiler-maker who asked you about his duty in the engine-room, do you mean as to the repairs to the boilers?—No, we were stopped and it was his duty below, and he had orders to pack the piston rods, which is a very simple job for anyone, but he did not know which were the piston rods, and when I pointed them out to him, he did not know in what way to start to pack them until I showed him.

3409. (*Captain Dowell.*) Would not the same thing

happen if a fitter were told to do something in the boiler?—No, I think any fitter could go and put a patch on a boiler if it were required.

3410. Or stop a leak in a tube or any thing of that sort?—Yes.

3411. (*The Chairman.*) Could you replace a tube in a boiler?—Yes, but I believe that a boiler-maker never makes a fitter.

3412. Did the master-at-arms, in your intercourse with him, ever report you to the commanding officer?—The only time that I was reported was on account of my sea chest not being of the regulation size, and likewise for refusing to get another, as I told the commander when I went on deck that I intended to leave the service, and should not lay out any money upon a chest, as the one I had was the one given to me. The size that they wanted me to get was 18 inches by three feet, which I told the commander was a box not a bit of good, and if one leaves one's clothes about the deck they put them in the scran bag, and you will not get them again.

3413. Had you a locker to put your clothes in?—No, the clean clothes, dirty clothes and uniform all go in together; the stokers have got a wash berth, and lockers and cupboards in which they can put their things.

3414. Have you ever been on board any other ship like the "Monarch," the "Minotaur" or the "Sultan," to see what sort of accommodation the engine-room artificers have?—I have been on them, but I have not been to sea in them.

3415. You are not aware what is the usual accommodation given to the engine-room artificers?—I do not know that I am. I have spoken to a good many engine-room artificers and they all find fault with the master-at-arms having anything to do with them.

3416. (*Captain Dowell.*) Do you know any of the engine-room artificers of the "Sultan"?—I do not personally.

(*The witness withdrew.*)

MR. WILLIAM TODNER, R.N., called and examined.

3417. (*The Chairman.*) Where are you now serving?—In the "Waterwitch."

3418. How long have you been in her?—About 2 years and 4 months.

3419. Where were you before?—In the "Monarch."

3420. Were you senior engineer of the "Monarch"?—Yes.

3421. How long were you in her?—Five years.

3422. Are you qualified for chief engineer?—No.

3423. Why not?—Because I do not think it is worth while qualifying myself; I am over 42 years of age, and have been over 20 years in the service.

3424. Why did not you think of qualifying at an earlier period?—Because I could not see any probability of my being promoted.

3425. When will you be able to retire?—According to the present order, in 2 years and 9 months' time.

3426. What retiring pension shall you then get?—I shall be entitled to the full scale, or £130, a-year.

3427. What is your pay now?—10s. a-day, and 1s. a-day charge money.

3428. How long have you been in the service?—Over 20 years.

3429. That is including your third class assistant's time?—All the time since I joined.

3430. Were you a third class assistant when you joined?—Yes.

3431. Where did you serve your time?—At Newcastle, at Messrs Hawkes, Crawshaw and Co., Gateshead.

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3432. What were they?—Engine makers, new iron, locomotives and anchors, and cables for the navy.

3433. If you had been enabled to get your maximum pension earlier, would you have accepted it?—Yes.

3434. Supposing by the regulations you could have got a pension of £130 a-year four or five years ago, would you have accepted it?—Yes.

3435. Have you any suggestions to offer to the Committee as to improving the flow of promotion from the rank of engineer to that of chief engineer?—There is no way that I can see except by clearing the list; there are too many, and I would reduce the numbers.

3436. How would you do that?—I would reduce the number of engineers in each ship, and substitute for them engine-room artificers.

3437. But how would you reduce the present list of engineers?—By letting them go at an increased pension to that which they are now entitled to, I think that 6d. a-day for each year served would be satisfactory.

3438. If over a certain age?—Over 40.

3439. Have you any idea what number of men that would allow to go?—Not more than 20.

3440. That would not be sufficient to reduce the list; what else would you suggest?—I would let them go at about 36 years of age.

3441. If retirement or pension were offered to the younger engineers on the list, do you think that many of them would accept it?—After 36 I think

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they would, because they cannot see their way clear to getting promotion in time at present.

3442. Did you pass any educational examination when you entered the service?—Yes, I passed at Woolwich before the chief engineer of the dockyard, Mr. Atherton.

3443. Have you any engine-room artificers in the "Waterwitch"?—No, but I had for a few months; for eight months I had one.

3444. What trade was he?—A fitter.

3445. Were you satisfied with him?—Yes.

3446. Was he a good workman?—Yes.

3447. Where did he come from?—From one of the government factories.

3448. Which one?—Devonport.

3449. Had you any in the "Monarch"?—Yes, 6 before we finished the commission.

3450. (*Captain Commerell*). And how many engineers?—Eight: we had 9 engineers, but they took one engineer away and sent 2 more engine-room artificers; she has 4 now.

3451. (*The Chairman*). What complement would you suggest for the "Monarch," on the understanding that the number of engineers is reduced, and the number of engine-room artificers increased?—1 chief, 5 engineers, and 6 engine-room artificers.

3452. Of what trades would you like to have the engine-room artificers in a ship like the "Monarch"?—Fitters; 70 per cent. fitters for general service.

3453. Do you think that a fitter can do work as a boiler maker when required?—Yes.

3454. Do you ever find boiler makers do any fitters' work?—They can do blacksmiths' work, but not fitters' work.

3455. Had you any smiths on board the "Monarch"?—Yes.

3456. As engine-room artificers?—Yes.

3457. Had you a blacksmith in the ship?—Yes.

3458. Which do you think was the better workman as a blacksmith?—The engine-room artificer was the best smith.

3459. Do you think, looking at the value of the trade of a smith, it is desirable to put them on the same footing as fitters?—No.

3460. You would consider the trade of a smith lower than that of a fitter?—Yes, a fitter is a better man altogether, a more intelligent and a more useful man.

3461. Had you a coppersmith in the "Monarch"?—Yes, one coppersmith.

3462. Did you find him of great use?—No.

3463. Did you find work for him?—Yes.

3464. But he was not a good man?—Not to attend to the boilers or engines, or anything of that sort, under steam.

3465. Did he know his own trade pretty well?—Yes.

3466. You require a man as engine-room artificer who is capable of doing other work than his own trade as a rule?—Yes.

3467. Did any of those men keep watch in the stokehold?—Yes, there were three watches, and one was in each watch.

3468. Did any of them ever assist in the engine-room?—They assisted the engineer of the watch when he called upon them, but as a rule, under steam, one engineer was always kept in the stokehold.

3469. Did any of those men ever obtain a certificate for having taken charge of the engine-room?—No, they did not, I should have known if they had, they only passed the examination on entry and no other.

3470. Do you remember how many of those men were qualified to take charge of the engines?—Three of them.

3471. Of what trades were they?—One was a boilermaker, one a fitter, and the other a blacksmith.

3472. And the other was not qualified?—No.

3473. What did you do as senior engineer in the "Monarch," did you keep watch?—Occasionally, the chief engineer gave me other work to do.

3474. You did general superintendence under him?—Yes.

3475. How many engineers have you in the "Waterwitch"?—Only myself at present.

3476. Have you been to sea in her?—Only just round the coast from Plymouth to here.

3477. What engineers had you then?—I had 3 besides myself.

3478. And no engine-room artificers?—No.

3479. Do you think that any man who receives a qualifying certificate to confirm him as an engine-room artificer, would be fit to take charge of the engines in a small ship?—Yes, in a small ship.

3480. From your experience of engine-room artificers do you consider them as a rule as good workmen as the junior engineers in the service?—Yes.

3481. Do you consider them superior workmen to the junior engineers?—Yes.

3482. That is as workmen?—Yes.

3483. If the engine-room artificers were increased in numbers, and the number of engineers decreased, would you still employ the engineers in the manual work of repairing the engines on ordinary occasions?—No, if the staff of artificers was good, it would not be necessary.

3484. Whatever be the number of artificers that you have in a ship, do you think it is desirable that in all ships there should be a proportion of engineer officers of superior education, rank, and position to the artificers?—Yes.

3485. You think that should be so certainly?—Yes.

3486. Have you had experience of artificers in the reserve at this port?—No.

3487. Do you think that the pay and position of the artificers are such as to induce good men to join the service?—No.

3488. What would you suggest?—5s. 6d. a-day on entry, and a progressive rise to 7s. a-day.

3489. How should that rise be regulated?—6d. a-day for each five years served.

3490. At the end of ten years to re-enter upon what?—6s. 6d. per day.

3491. Is there any other improvement which you would make in their position, in order to induce good men to enter the service?—No.

3492. You think that the position is good enough?—Yes.

3493. Do you think that their uniform is satisfactory?—Yes, with the exception of the jacket, there is an objection to that. On the occasions on which they have to go on shore, they complain and say that it is cold.

3494. What sort of coat would you suggest for them?—I would let them have a tunic some description, a good warm one.

3495. A pea-jacket, or what we call a pea-jacket?—What we call a reefer, the monkey-jacket, which they have now they look slovenly in.

3496. What sort of one is it?—A loose tunic to wear over their ordinary jacket.

3497. With uniform buttons on it?—Yes.

3498. You mean that you would recommend a tight fitting jacket to cover the hips?—Yes, when it is buttoned up it will fit them.

3499. Have you had any experience or any trial with regard to their mess on the lower deck?—I want a separate mess to themselves.

3500. I would rather have your own suggestion as to what you think they ought to have, would you suggest with regard to their mess arrangements?—I think they ought to have a separate mess, and some one to keep it clean for them, and the chief engineer should be responsible for its cleanliness to the captain, and responsible both for clothes, mess, and hammocks.

3501. You would not have them under the master-at-arms?—No, they do not seem to agree at all.

3502. With regard to their leave, do you think they should obtain leave from the senior engineer

or chief engineer on board?—Yes, in the "Monarch" I used to give them leave, and send a chit to the master-at-arms, and he always let them go, because I had to work those men when the rest of the ship's company had gone on shore.

3503. When you say "he always let them go," had he the power to stop them?—No, he had not in the "Monarch."

3504. (*Captain Commerell.*) Did you ever find any clashing between the engine-room artificers and the master-at-arms?—Yes.

3505. (*The Chairman.*) In what respect?—Just their own little grievances between the master-at-arms and themselves, they told him that they had a right to mess with him according to the Admiralty circular, but I can quite understand the master-at-arms not having them all in his small mess, because he has a deal of work to do, and should be by himself.

3506. (*Captain Dowell.*) Where did they mess?—In a proper mess told off for them, but it was not as comfortable as it ought to have been.

3507. (*The Chairman.*) Was it open or closed?—Open.

3508. (*Captain Dowell.*) Simply a mess table?—Yes.

3509. (*The Chairman.*) If put under the chief engineer as regards the cleanliness of their mess and so on, where would you have them mess in a ship like the "Monarch"?—I think they should have a mess enclosed in a cool place in the main deck battery.

3510. If they had a mess place on the lower deck, is it not necessary that whoever has charge of the lower deck must be responsible for that mess place being clean, and would it not be inconvenient that the engineer should have charge of one portion and not the other?—I would make the senior engineer and chief responsible for the cleanliness of the mess, inside and out.

3511. Is there in a ship like the "Monarch" any position where you think it would be preferable to place the engine-room artificers' mess, such for instance as the turret room?—The turret room of the "Monarch" would make a very good place, because Captain Commerell had some hatches cut over there, it was all decked over at one time, but now two hatches have been cut for ventilation on each side.

3512. Do you think we should have any difficulty in getting the number of good engine-room artificers we wanted in case of an increase in their numbers?—I should think if it were advertised, and so made known in all the counties, you would not.

3513. If the pay were increased as you suggest?—Yes.

3514. Would you under any circumstances make them warrant officers?—I think it would be advisable during the last five years of their time, but not before.

3515. Would you make all of them warrant officers, or only a few?—A few that are very good men, both as to qualifications and conduct; I think that would be a great inducement to get good men.

3516. To what trades would you limit the artificers?—I would have 70 per cent. of fitters.

3517. And the other 30 per cent.?—Boilermakers.

3518. No coppersmiths?—I do not think it is necessary to have coppersmiths if you have good boilermakers; a boilermaker would do the work of a blacksmith.

3519. Who would do the coppersmith's work?—I never had enough work to employ them entirely.

3520. What trade do you think would braze pipes, and do coppersmith's works?—A fitter generally has a pretty good idea of anything of that sort; the coppersmiths that I have had anything to do with, have never done anything but repair lamps and small things of that kind.

3521. (*Mr. Wright.*) Your pipes on board the "Monarch" must have been very good?—The only

difficulties we had, was with the double bolting of the pipes; the pipes themselves were very good.

3522. (*The Chairman.*) With those advantages you recommend the engine-room artificers should have, would you think that they ought to be satisfied with the pension now given to them, which is the same as a chief petty officer's?—I would suggest that it should be increased a little; they seem to look forward to their pension more than anything else, at least all the engine-room artificers that I have met with have said so.

3523. (*Captain Dowell.*) Do not you think it would be an objection if made warrant officers, that they would have to serve on till 55 or 60 years of age?—I have no doubt that they would like to serve on the same as the other warrant officers we have.

3524. (*Captain Commerell.*) Would they be above doing manual work do you think?—I should think not.

3524*. (*The Chairman.*) At what age is a man pensioned in the factory here?—At the age of 60.

3525. Do you think that an engine-room artificer would be capable of doing his work up to the age of 50?—Yes, especially if he were made a warrant officer.

3526. Would you suggest that when an artificer has served for 20 years, he might still remain in the service upon an increased pension?—Yes.

3527. You think that he would be capable up to the age of 50 to do good work as an artificer, receiving the increased pension?—Yes.

3528. Do you think that the engine-room artificers would, after a certain period at sea, like to come on shore for a few years, their time going on with the same pay that they receive at sea?—Yes.

3529. You think that would be an inducement to them?—Yes, I should think it would be a boon to them.

3530. (*Captain Dowell.*) Would it be satisfactory to the factory do you think?—I should think so.

3531. (*The Chairman.*) Have you any suggestions to offer to the Committee as to the pay and position of the engineers in the service?—Yes, I think they ought to have progressive pay while serving; I have been nearly 13 years in the rank of engineer, receiving 9s. and 10s. a-day.

3532. At what age did you expect to be chief engineer when you entered the service?—At about 32.

3533. Do you think for the good of the service that that would be a good age for men to be promoted to the rank of chief engineer?—Yes, it ought not to be later than that.

3534. If you were promoted to the rank of chief engineer now, would you probably have to go on half-pay?—Yes, for 12 months at least.

3535. At what rate?—At 6s. a-day.

3536. Would you consider that a hardship?—Yes.

3537. Would you like to have a quiet time on shore?—I would rather work and make more money and time.

3538. Do you think that is the case with most men in your position?—Yes, promotion does not only give you less money, but it throws you back in time.

3539. Are you satisfied with the present regulations for the entry of engineer students?—I think it would stimulate them more, if you had them from private firms to compete with those in the dockyard.

3540. You mean when they had completed their time?—Yes.

3541. I refer to the first entry; it is at present by competitive examination only?—I think the Admiralty ought to have the nomination, instead of the local officials.

3542. Are you aware that there is no nomination at present; any man who applies is accepted if he can pass the examination?—I think that ought to be altered; the Admiralty ought to see into that, and select them after they get the names from here.

3543. Would it not be better that the parents

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should make their application direct to the Admiralty without any local influence whatever?—Yes; it all lies in the hands of two schoolmasters, outside the dockyard, who cram the youths for the examination.

3544. You are not satisfied with the class of lads who enter?—No, I think that the pay they get in the dockyard enables fathers to put them in, let them be ever so poor or low.

3545. With respect to the pay, if the Admiralty had the nomination, would not that enable them to ensure a proper class of men being admitted?—Yes.

3546. Are you acquainted with the system of training that the engineer students pass through in the dockyard?—No.

3547. As far as you have seen anything of the young engineers entering the service, what do you think of them?—I think that the education that they receive is beyond their practical qualifications, and I think that their practical knowledge ought to be attended to a little more; I do not mean to do away with the education, for that is a good thing.

3548. You think that their practical manual work is not so good as it ought to be?—Quite so.

3549. Do you think with proper attention that their education could be kept up to the proper standard, and their practical work improved?—Yes, some that come out of the dockyard, are very good and handy officers at anything, either drawing or working.

3550. Did you learn drawing before you became an engineer, mechanical drawing?—No, I was never fond of that, but I can make a sketch for anything that is required on board ship.

3551. Do you think that a knowledge of drawing is of value?—Yes, at the present time of great value, with the machinery that we have got now; good draughtsmen we find very useful on board ship.

3552. You spoke just now of a progressive rate of pay to the engineers, what would you suggest?—I should think that I ought not to have less than 12s. a-day now.

3553. That an engineer of 42 years of age ought not to have less than 12s. a-day?—Yes.

3554. (*Captain Dowell.*) You would have been promoted if you had qualified?—I should only have been promoted to the rank of chief engineer three months ago.

3555. (*The Chairman.*) Supposing you left the service on a pension, what should you do?—I should try some other employment, if my pension was not sufficient, which I hope it would be.

3556. From where did you come?—From Newcastle.

3557. Would you look out for a situation as engineer or to superintend an engine or something of that sort?—Yes.

3558. Do you think that sort of work is given to men leaving the service?—It all depends upon qualifications and character.

3559. Do you think that young engineers between the ages of 30 and 40 if pensioned, would be able to get employment somewhere or other without much trouble?—About a third would.

3560. Why only a third?—Because they had not been accustomed to it before they came into the service; after being for a certain time in the service they are not worth much as engineers on shore, that is to say, after 15 years in the service.

3561. Could not they get employment in the steam ships of the mercantile marine?—About a third of them would.

3562. Have you had any intercourse with the engineers in the mercantile marine?—Not much; a little before I entered the service, but not since.

3563. Would you rather have an engine-room artificer who had been brought up in the private trade or one from our factory?—One from the private trade.

3564. Why?—Because I have always found them

to know everything that is necessary; if you take a man from the private trade he is almost sure to be a good man, if he has gone through the proper routine.

3565. Do you mean a man who has been brought up from a boy in the private trade?—A boy who has been brought up in the private trade, and then comes to work in the dockyard; I have found them good men generally.

3566. You think then that the boys learn their trade better in the private firms than in the government factories?—Yes; they do not have quite so much education, but they have a better practical knowledge.

3567. Do you consider that the trade boys in the factory learn their work as well as the boys in the private trade?—No.

3568. Have you any reason to give for that?—Because in the private firms they have to look after their people and keep them at work more so than is the case in the dockyard.

3569. You mean that there is more supervision in the private trade?—Not exactly more supervision, but still the boys must keep at their work continually, and learn it properly, or else they would not keep them.

3570. Are you aware that the trade boys in the factories are as a rule taken into the private trade when they have completed their time in the factory, instead of being entered in the service?—No, I am not. My experience of private firms is that the men in them have to work, and not idle away their time, they have men to look after them and keep them at their work. I do not speak of very large firms.

3571. Is not that your experience of 20 years ago?—Yes.

3572. (*Captain Dowell.*) You say that you think you ought receive 12s. a-day, what pay do you think an assistant engineer should begin at?—As it is now, at 6s. a-day, with progressive increase, so that they would have something to look forward to.

3573. Do you think it would be beneficial to the service if the two classes of assistant engineers were done away with?—It would be better to do away with the assistant engineers entirely. They should enter as engineers, and rise with progressive pay.

3574. You would never increase your rank then?—I would not mind that so long as the pay increased.

3575. Is it not customary for all people connected with the engine-room, the stokers, engine-room artificers, and everybody else, to be, as far as themselves and clothes are concerned, under the chief engineer?—Yes; if each engineer has got his proportion of stokers and is responsible to the chief engineer, but in the "Monarch" each engineer was responsible to the lieutenant of the division.

3576. That is not the case now in the service, is it?—I do not know.

3577. (*Captain Commerell.*) The chief engineer himself reported his division to me on Sunday?—Quite so; as far as my affairs were concerned the engineer was responsible to the lieutenant of the division.

3578. (*Captain Dowell.*) Who had charge of your double bottom in the "Monarch"?—Three different engineers, with a staff of men each. The ship was as it were divided into three, and one engineer took from the keel of the ship right up to the upper deck, every portion of that compartment.

3579. (*The Chairman.*) Right fore and aft the ship?—Yes, right fore and aft.

3580. (*Captain Dowell.*) Did they keep watch besides?—Yes.

3581. Who did the office work in that ship?—The junior engineer.

3582. (*Captain Commerell.*) What was his name?—Mr. Bills.

3583. Do you think it absolutely necessary that

the engineers in the service should be capable of fitting and attending to the different parts of the engines themselves?—Yes.

3584. As a rule?—As a rule they ought to be able to do it themselves, and then they would be able to direct others.

3585. Do you think that the engineers are as good workmen as the engine-room artificers as a rule?—No, not those that have joined lately.

3586. Do you think it necessary they should be?—Yes, they should be.

3587. Are you at all aware of what the pay of an engineer in the merchant service is as compared with ours?—They get more on the average than we do, but I could not tell you the exact amount, although I know it is more.

3588. Do you know whether that is merely because they get a large allowance for their mess?—That is independent of their mess. The Cunard Company keep their engineers, without interfering with their pay at all, in bedding, food, and everything.

3589. (*The Chairman.*) Do you know whether they have any pension?—I do not know that.

3590. (*Captain Commerell.*) You have not qualified for chief engineer?—No.

3591. Why did you not qualify?—Because I did not think it was worth while, as I could not get my time in. If I had passed and been promoted I should have been 43 years of age before I obtained employment, and then if I got one ship I should have been placed on half-pay again before I got another.

3592. Supposing you could have made up all your junior time would you have qualified?—Yes.

3593. If you had your time given to you now would you qualify?—Yes.

3594. (*The Chairman.*) At what age would you then be able to retire according to the present regulations?—I should be able to retire at 50.

3595. (*Captain Commerell.*) If you do away with the rank of assistant engineer, do not you think that there might be considerable dissatisfaction at the young men, who had just left the factory, having barely completed their education, being of the same rank as men who had served for 20 years, and were just going on the list as chief engineers?—No, I would like them to have their uniform according to their time, the same as I would their pay.

3596. Do you think it is the wish of the engineers that the engineers' mess should be done away with?—Yes, that is the general feeling right throughout the service.

3597. Do you think that all the engineers could afford the expense of joining their relative messes?—Not at the present rate of pay.

3598. Do you think that the service is altogether ripe for the immediate abolition of the engineers' mess, and the transference of a portion of the officers into the gun-room?—Not unless the pay is increased.

3599. That is to say, bearing in mind the class from which the engineer students are now taken?—Yes, I think to make the alteration now would answer every purpose, to do away with the engineers'

mess. I lived in the gun-room when I was young in the service, and I think in the future, things will be quite different, and you will be able to put a few in the ward-room. I have seen a number of engineers that I would not put either in the gun-room or ward-room, but would let them go by themselves or leave the service.

3600. It has been recommended that the evening schooling of the engineer students should be discontinued. Is that your opinion?—No.

3601. (*The Chairman.*) I think you said just now that you were in the gun-room mess yourself?—Yes, in the "Sybil" sailing frigate. I was there because there was not an engineers' mess on board. I came from Ascension to England with Admiral Elliot, then Commodore Elliot.

3602. Do you imagine that there is any difficulty with the engine-room artificers as regards their washing arrangements, or bathing arrangements on board ship. Where are they supposed to wash?—They have not got a stated place; they could wash in the stokers' bath on board the "Monarch," in was a very nice place at that time.

3603. Had they not to wait to take their turn with the stokers?—They could always manage that.

3604. Do you think it is desirable that some arrangement should be made to give the engine-room artificers that bath-room to themselves for a time?—Yes.

3605. You say that the "Monarch" was a ship divided into compartments, of which three engineers had charge?—Yes.

3606. Did that include the charge of any small engines which there might be in that division?—Yes, right up and down in that compartment.

3607. Did any small engines fall to the charge of an engineer in that compartment?—Yes.

3608. Had you small engines?—Yes, a great number, 14 or 15.

3609. For turning the turrets and so on?—Yes.

3610. They were not in charge of one man, were they?—They were in charge of the engineers who had charge of the respective compartments.

3611. Have you any other suggestion to offer to the Committee with regard to the engineers and engine-room artificers?—I think that the students when they first come into the dockyard ought to be kept in the dockyard, to come in at a certain time at night, and have a mess and sleeping place in the dockyard.

3612. You think it would be desirable that they should reside and mess in the dockyard?—Yes.

3613. I presume you mean at their own expense?—Yes.

3614. Would you make it imperative on them that they should belong to that mess, even if they lived in the neighbourhood?—Yes.

3615. Unless special permission were given by the superintendent of the yard to them to go outside?—Yes, the Admiral-Superintendent would be able to see them, and it would keep them out of the streets late at night, if that were done.

Mr. W.
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(*The witness withdrew.*)

GEORGE NANCARROW, Engine-room Artificer, called and examined.

3616. (*The Chairman.*) Where are you now serving?—In the "Vesuvius" torpedo ship.

3617. How long have you been in the service?—4 years and 8 months.

3618. Where did you serve before you were in the "Vesuvius"?—In the "Spartan," and the "Asia" before that.

3619. Were you at sea in the "Spartan"?—Yes.

3620. How long were you at sea?—For 3 years and 11 months. G.Nancarrow.

3621. At what station?—The West Indies. 28 Oct., 1875.

3622. Did you go to sea immediately after you entered the service?—Five months after I entered.

3623. Where were you during that five months?—In the "Volcano" floating factory at Portsmouth.

3624. Where were you before you entered the navy?—In Portsmouth steam factory.

- G. Nancarrow. 3625. What age were you?—32 years of age.
- 28 Oct., 1875. 3626. How long had you been in the steam factory before you entered the "Volcano"?—8 years and 90 days.
3627. Where did you serve your time?—In a private firm at Portsmouth.
3628. What firm was that?—Messrs. Woods and Son.
3629. What were they?—Engineers.
3630. What did they do; repair or build engines?—Repair engines of small steamboats.
3631. How many years did you serve with them?—7 years.
3632. Did you remain with them after you had served your time?—Yes, 14 months.
3633. What pay did you get there?—5s. a-day.
3634. What pay did you get in the factory?—5s. 8d. a-day.
3635. On day pay, not per hour?—Yes.
3636. That would be 34s. a-week?—Yes.
3637. What trade are you?—An engine fitter.
3638. Did you work in any particular shop here, in the factory, before you went into the navy?—Yes, in one shop all the time.
3639. What work had you to do?—I was working under Mr. Hoare in the millwright department.
3640. Were you a millwright?—I was a fitter, but they have millwrights and fitters there.
3641. You entered as a fitter?—Yes, as a fitter.
3642. And a hired man?—Yes.
3643. What induced you to enter the service?—I thought I should like to go to sea; but at the same time heavy discharges were taking place in the dockyard.
3644. And you were afraid that your turn might come?—Yes; I was afraid of that, and I thought I should like to go to sea; that is why I joined.
3645. How long have you been in the "Vesuvius"?—About a month.
3646. Where did you mess in the "Spartan"?—With the other petty officers of the ship.
3647. Who were they?—First class petty officers.
3648. Had they any chief petty officers there?—A ship's steward that was the only chief petty officer, and ship's cook, there was the ship's company.
3649. Where did they mess?—With me.
3650. Did the captain of the maintop mess with you?—Yes, and the boatswain's mate.
3651. Were you comfortable in your mess?—Very uncomfortable.
3652. Were there any other engine-room artificers besides yourself?—Yes, one.
3653. Was there a master-at-arms in the ship?—There was a first class corporal doing the duty of master-at-arms.
3654. How many engineers were there in that ship?—Two engineers and a chief.
3655. Did you ever take charge of the engines in that ship?—During the whole commission I kept watch in the engine-room, there were three watches, the other artificer kept stokehold watch.
3656. When did you get your certificate of qualification to take charge of engines?—In August, 1872.
3657. Was that after you joined the "Spartan"?—Yes, in Jamaica.
3658. Where did you obtain your knowledge of the management of marine engines?—During the whole of my career in the trade of course I have had to do with small engines, and large ones too at times.
3659. In steamers?—Yes, in steamboats.
3660. Not only repairing, but seeing them working?—Yes, and I have driven them.
3661. You find yourself at home with marine engines?—Yes.
3662. What trade was the other artificer with you?—He was a boilermaker.
3663. Could he take charge of the engines?—No.
3664. Did he ever do so?—He did the last part of the commission on purpose to get himself qualified for confirmation.
3665. Did that boilermaker do any fitter's work?—No.
3666. Could he?—I do not know, but he was employed at his own profession.
3667. Was there work enough for him?—Yes, there was always something to do.
3668. Could you work at boiler work, put a patch on or a tube in?—Yes.
3669. Could you do everything that a boilermaker could do?—I do not suppose I could.
3670. What could not you do?—Of course a boiler-maker has to learn his profession.
3671. Specify anything that you could not do?—I do not think there would be any job wanted to be done on board ship that I could not do.
3672. Do you belong to a trades union?—No.
3673. Did you ever?—No.
3674. Did the other artificer?—Yes, he did.
3675. So long as you belong to a trades union, is there any difficulty about transferring work from one trade to another, according to the laws of the union?—I do not know that.
3676. You say that you were uncomfortable in the mess?—Yes, very.
3677. Why?—Simply because the other petty officers thought that I ought to take my turn as cook of the mess and at scrubbing the deck, of course I had never been used to that sort of work, and strongly objected to it, and that made it very uncomfortable; I went on the quarter-deck several times about it, and the captain said that no one was provided for us to look after our mess, and we should have to make the best we could of it.
3678. And you did so?—We did so for about 18 months of the commission, and the captain then gave us a mess to ourselves with two boys to look after it, at least not exactly to look after it, because they had duties to perform on deck, and we were just as bad off as before, they were not excused from anything.
3679. Did you at any time have to cook for the mess?—No.
3680. Did you ever cook before?—No.
3681. Do not you think it is a good thing to learn a little cooking, or do you see any real hardship in it, supposing you have spare time?—The chief engineer objected to it, he said he wanted me below.
3682. It interfered with your duties below?—There was so much to do below, he could not spare me to cook messes, to get the mess ready, and clean the mess.
3683. Had you any food in that mess besides the ship's provisions?—Yes.
3684. Potatoes and things of that sort?—Yes.
3685. On the whole you lived fairly well as far as food was concerned?—Yes, pretty well.
3686. If you had the power yourself of making any reasonable alteration in the position of engine-room artificers on board ship, what would you suggest yourself as an improvement; begin at their pay if you like?—I think if they had progressive pay and a comfortable place to mess in it would be an encouragement to them.
3687. Could you suggest practically what you would call a comfortable place to mess in; think of large ships, have you had any experience in them?—I have not had experience in them.
3688. What could they do in the "Spartan"?—They could have put a mess to themselves. If we had had some one excused to look after us, we should have been more comfortable, we wanted somebody exclusively.
3689. Did you mess alone?—No, the ship's steward and ourselves, there were other petty officers.
3690. You had no master-at-arms?—No.
3691. Have you any other point which you find objectionable?—Another thing is that the chest is not large enough to contain the uniform and clothes required on a station when four years away.

3692. What size chest is it?—Three feet by 18 inches by 18 inches.

3693. Had you any lockers for your dirty clothes?—No, nothing but the chest.

3694. If you had that chest together with a locker and bag, would you prefer it to having a large chest without anything else?—I think that a larger chest without a locker would be best.

3695. You would like to put your uniform in with your working clothes?—We have a parting for the working and uniform clothes to be kept separate.

3696. Is there any other point you wish to mention?—There is the uniform. I think there might be some alteration in that, these short jackets are not very suitable.

3697. What objection have you to them?—In winter time they are cold, and we must appear in them for full uniform as they call it.

3698. Are you allowed a monkey-jacket overall?—We can wear it, but not at divisions.

3699. Nor when going on shore?—No.

3700. You say that the pay should be progressive, up to what amount would you suggest it should go at the end of 10 years, and then up to 15 years what would you recommend it to be?—I should think after 10 years' service about 7s. or 8s. a-day, and 9s. a-day after 12 or 15 years' service.

3701. What did you understand your pension would be when you joined the service?—The same as that of other chief petty officers. I did not know what a chief petty officer's pension was at that time, but there was no difference between mine and his I found when I joined the service.

3702. Therefore the maximum pension that you can get is how much?—About £52 a-year.

3703. Was the pension an attraction to you, or do you think it is an attraction to men to join?—I think so.

3704. Are you a married man?—Yes.

3705. Have you ever been thrown amongst other artificers in the navy?—Yes.

3706. Of what trades are they in the steam reserve here?—There are five trades in the steam reserve here, there are moulders, blacksmiths, copper-smiths, fitters, and boiler-makers.

3707. Do you consider that those trades are all equal in value, as regards qualification and use on board ship?—I consider that they are all equal.

3708. You consider that a blacksmith and a fitter are of equal value?—Yes; in their own trades.

3709. Had you any blacksmith in the "Spartan"?—A stoker mechanic.

3710. Who was the blacksmith?—Yes, he was.

3711. Was there any ship's blacksmith?—Yes.

3712. Were they equally good?—The ship's blacksmith was a far superior mechanic to the stoker mechanic.

3713. Do you think that that ship's blacksmith would be worth entering as an engine-room artificer, looking to the use he would be in the engine-room?—Yes.

3714. Why has he not entered as an engine-room artificer, or why did he not enter?—Because he joined the service before we had engine-room artificers in the navy.

3715. Why did not he transfer himself?—I suppose he thought he could not pass the examination for it.

3716. The educational one?—Yes.

3717. What were you examined in when you entered the service?—I was examined in arithmetic, and questioned on the marine engine and boilers, and had dictation.

3718. Did you ever keep the engine-room register in the "Spartan"?—Yes; the rough register.

3719. Who wrote it out fair?—The chief engineer, Mr. Heffernan.

3720. Did the ship's corporals trouble you much in the "Spartan"?—They interfered with us.

3721. What do you call interfering with you?—

They wanted us to always tell them when we went on shore, and run about after them to tell them so; and the same when we came on board; of course the senior corporal did master-at-arms' duty, and carried it out.

3722. You did not have far to run to tell him, I suppose?—That is only one little thing, but they had many ways to annoy a man.

3723. Of whom did you ask leave?—The chief engineer first, and then went to the commanding officer, and then had to go to the master-at-arms.

3724. To tell the master-at-arms?—Yes.

3725. Did you call him master-at-arms?—Yes.

3726. And told him when you went ashore?—Yes.

3727. And when you came on board what did you do?—I reported myself to the corporal.

3728. At night or day?—At night or whenever we came on board.

3729. How often did you get leave?—When we could be spared.

3730. Not with the rest of the ship's company?—Not as a rule.

3731. When you could be spared from the engine-room?—Yes.

3732. You were in the West Indies, I think?—Yes.

3733. Did you get leave as often as you wished, or did you have any difficulty in obtaining leave?—No; no difficulty, not the slightest.

3734. Altogether do you like the service?—Yes; I like the service, but I should like it very much better if there was more comfort for us on board.

3735. You went to sea at the age of 32 years, I think?—Yes.

3736. Do you like sleeping in a hammock?—Yes; very well.

3737. (*Captain Dowell.*) Who looked after your hammock?—I had a man to look after it, and had to pay him for doing so.

3738. What did you pay him?—7s. a-month; but he used to wash some clothes and all for me.

3739. (*The Chairman.*) That was for taking your hammock up and down, scrubbing it, and washing your working clothes?—Yes.

3740. Was he a stoker?—Yes.

3741. (*Captain Dowell.*) What were your washing arrangements after you came off duty, where did you wash?—There was one bath that was called the stokers' bath, and we had to wash there.

3742. Was there any difficulty about that?—Sometimes we had to wait until they were all done before we could get to wash, and if we did not ask anyone to fetch the water for us, we had to fetch it ourselves.

3743. (*The Chairman.*) Was not the water laid on?—Not to the bath, we had to fetch it from the tanks.

3744. (*Captain Dowell.*) Do you think it would have been satisfactory if you had had a stoker messing with you, who would have been expected to clean your mess, the chief engineer to excuse him for that purpose?—That might have been done very well, but in small ships he never can excuse a stoker for that purpose. I know several engine-room artificers that were in ships of the same class as the "Spartan" who wanted to mess with the stokers for that very reason so that they should be totally exempt from all duties in the mess.

3745. That was not satisfactory was it?—No, a long way from it.

3746. Where did you muster in the "Spartan"?—With the stokers.

3747. Was there any lieutenant of the division?—A sub-lieutenant.

3748. Not an engineer?—No.

3749. What pension did you think you should receive when you entered the service; you said that you expected to receive a pension, but what was your idea as to what it would be?—I thought we

G. Nancarrow.
28 Oct., 1876.

G.Nancarrow. should get the same pension as other chief petty officers.
28. Oct., 1875.

3750. Had you any idea what that would be?—I had not at the time I joined the service, afterwards I found out that the pension would be about £52 a-year.

3751. Do not you think that is a very good pension?—It is a very good pension, but I think there should be some difference between first class petty officers and chief petty officers.

3752. Shall you enter again for the second 10 years?—I do not think I shall, unless some alteration is made.

3753. If those alterations which you suggest are made, would you then think of doing so?—Yes.

3754. (*Captain Commerell.*) Are you aware that if certain privileges which you ask for are awarded to engine-room artificers, the rest of the chief petty officers in the service may very reasonably complain that flesh should be made of one, and fowl of the other; under those circumstances which would you value more, the rank of a chief petty officer with all its privileges, but the disagreeables of which you complain, or to have no relative rank at all and to be very much more under the chief engineer?—I should prefer to have no rank whatever, and to be under the chief engineer wholly and solely.

3755. Do you know what the pay of a chief gunner's mate, chief carpenter's mate, chief boatswain's mate, and other chief petty officers amounts to?—I do not know their pay.

3756. From 2s. 9d. to 3s. per day; now you have great present advantages, and would have further because you ask for treble their pay, 9s. a-day, and an increased pension in proportion, do not you think it reasonable to suppose that the rest of the chief petty officers would complain of that?—No doubt they would do so.

3757. Do not you think it would lead to great dissatisfaction?—Perhaps it would.

3758. Therefore if you had no relative rank, of course it would be nothing to them what pay or pension you got; do you think that the engine-room artificers would prefer to have no relative rank?—I think they would prefer to have the pay and pension to the rank.

3759. When you messed with the chief petty officers in the "Spartan," did you find any dissatisfaction amongst them at your having so very much more pay than they had?—No, I do not know that I ever heard it mentioned amongst them; the only dissatisfaction was with regard to the mess; they did not want us there unless we did the same as they did, cook and clean the mess.

3760. You would infinitely prefer having a mess to yourselves as near the engine-room as possible?—Yes; it would be more convenient near the engine-room than right forward; our work is very dirty, and we make a mess about the deck.

3761. In the "Spartan" do you think that the first class ship's corporal made himself unnecessarily disagreeable in carrying out the discipline as far as you were concerned?—Not unnecessarily so I think, of course that is the only one I have had any dealings with.

3762. Have you heard of complaints to the contrary from other engine-room artificers?—I have from several.

3763. Can you give us any reason for that?—No, I do not know that I can give any reason why they should do so.

3764. Do you think it may arise from your entering into the service so late in life, as to make you rather more impatient of naval discipline than others who have been brought up in the service?—That may perhaps have a little to do with it.

3765. Which should you consider would be the

more suitable to take charge of the engine room in a small ship, the ordinary run of smith, boiler artificer, or fitter artificer?—The fitter artificer by all means.

3766. I suppose on account of his general education having led him more in the way of marine engines?—Yes, of course he is more amongst steam engines.

3767. (*The Chairman.*) How long have you been in the "Vesuvius"?—Not quite a month.

3768. How long shall you remain there?—I do not know.

3769. Ordinarily are you appointed for any particular time or are you available for sea service?—I am drafted to her but for no stated time.

3770. Do you live on board?—Yes.

3771. You sleep on shore at night, I suppose?—I take my turn on board.

3772. Do you get provisions?—We draw our provisions from the "Excellent"

3773. You do not get paid for your provisions?—No.

3774. Have you ever been in the steam reserve and been paid for your provisions?—Yes.

3775. Do you think it is a great boon?—It is done in the floating factories, but not in ships such as the "Vesuvius" and the gun-boats.

3776. Do you think it is a great thing when you get it?—It is better than being on the ship's provisions.

3777. The ship's provisions ought to be considered as an element in your pay to a certain amount because you either get food or one shilling a-day in lieu?—Yes.

3778. Do you think that it would be popular with the engine-room artificers, if after serving 10 or 15 years at sea, they were to be admitted into the factory with the same pay and prospect of pension as they have now, and to work in the factory as fitters or what not for a certain time?—I think it would.

3779. Do you think that would be a thing they would like?—I think so.

3780. Supposing it were offered to an engine-room artificer, who had re-entered for a second period of service, that he should come on shore to the factory for 5 years on the understanding that he must go to sea when required, you think that many of them would like to accept it?—Yes.

3781. How old shall you be when you get your pension?—52 years.

3782. When at the age to receive your pension would you rather get your pension and go, or continue to serve 6 or 8 years longer with the prospect of an increase of pension at the end of that time?—Some get it at 42.

3783. Do you think a man would rather receive his pension and go, or serve on and get an increase of pension when he does leave, either at 42 or 52 years, or whatever it may be?—Some would prefer the one, and some the other, it would not be general.

3784. Supposing at the end of 12 years' service you could be made a warrant officer, in which case you would be required to serve at sea until the age of 60, would you like it?—I should not.

3785. Do you think that would be generally popular with the men?—I do not think so.

3786. Do you insure your life?—No.

3787. Would the engine-room artificers consider it a reward if those men of good character were insured a term of service in the steam reserve for 2 or 3 years, after they had been at sea for 5 or 6 years?—They like service at home after being away.

3788. They can be with their families?—Yes.

3789. And have the Sunday holiday?—Yes.

3790. And in many cases get pay and provisions?—Yes.

(*The witness withdrew.*)

CHARLES JOHN MARTIN, Esq., R.N., called and examined.

3791. (*The Chairman.*) What is your rank?—A chief engineer, 19th of May 1870.

3792. In what ship are you serving?—In the "Zealous."

3793. How long have you been in the "Zealous"?—Since the 4th of June last.

3794. Where were you before that?—In the "Cadmus."

3795. On what station?—The Flying Squadron, and China station.

3796. How long were you in the "Cadmus"?—four years and two months.

3797. The "Zealous" is now in the reserve, is she not?—Yes.

3798. How long have you been in the service?—21½ years, since February, 1854.

3799. You were promoted to the rank of chief engineer in 1870?—Yes.

3800. How long were you on half-pay?—Three months nearly, the first time. I took my chance of employment. I came home from the East Indies at that time in bad health, and joined the ship that I was appointed to.

3801. In what ship did you come home?—I came home by mail steamer, invalided.

3802. How long were you in the East Indies?—5 months, in the "Teazer." My promotion I received at the time of my leaving the station.

3803. Did you get any leave on full-pay?—Yes, the usual six weeks, on paying off the "Cadmus."

3804. A fortnight for every year?—Yes, for the latter three years.

3805. Do you think that the promotion amongst engineers is satisfactory just now?—It is very slow indeed.

3806. At what age were you promoted to the rank of chief engineer?—At 38.

3807. Is that below the average age?—Slightly below the present average.

3808. You were the last of the batch that was promoted?—Yes.

3809. Were you promoted before your time?—No, I think not; my promotion was due to the introduction of Mr. Childers' scheme, which brought up that batch at the time in 1870.

3810. Did you join the service as a third class engineer?—As a third class assistant.

3811. When can you retire now if you wish to?—Before I can put my sea time in, 11 years; taking the average chances of the service, I shall have to serve nearly seven years longer, and that will make me about 52 years of age.

3812. If you retire at the age of 50, what retirement by the present regulations will you get?—That I have not exactly calculated. I should lose a very large proportion of junior time by retiring at 50 years of age; what the exact amount is I cannot state, but I know it is pretty considerable, because I have a lot of junior time.

3813. Do you consider the promotion of engineers is satisfactory?—I think it is very slow.

3814. Have you any suggestions to offer to the Committee by way of improving it?—I think that more appointments to the rank of chief engineer might be made, and that would give more promotion to the engineers.

3815. About what number do you think there could be given?—I think the list might be increased to 200 or to 210, and I think there would be ample employment for them.

3816. In smaller vessels?—Yes.

3817. You do not think that would have the effect of putting men on half-pay for long?—No, I think not.

3818. You would not wish to increase the list of chief engineers if it involved your going on half-pay?—No, certainly not.

3819. If that course were pursued, and the chief

engineers' list was increased by 40, do you think that promotion would be in a good condition then?—I think that things would be much more satisfactory than they are now.

3820. Is there anything else you would suggest for improving the promotion of the engineers?—I think that the number of engineers might be considerably reduced as a body; that would open up greater chances of promotion to the rank of chief engineer.

3821. Would you reduce them in each ship?—In certain classes of ships. In some ships it is not altogether practicable to reduce the staff lower than it is at present, but in other ships it might be considerably reduced.

3822. Take a ship like the "Sultan" for instance, do you know what her complement is at present?—I think she is allowed 1 chief, 9 engineers, and 4 engine-room artificers.

3823. That being the complement at present, what alteration would you suggest as practicable, what is the lowest number that you think we ought to have in the "Sultan"?—Five engineers.

3824. Would you increase the number of engine-room artificers in proportion as you reduce the number of engineers?—I would make a slight addition; if I took four engineers away I would put in about six or seven engine-room artificers.

3825. Why do you think you would want more engine-room artificers than engineers?—I think as a body of men they are a valuable working staff, and I think the addition might be made with advantage to the service.

3826. Do you think that an artificer is as good a workman as a young engineer?—He may be a greater expert with his tools.

3827. If he is as good an expert with his tools, would he not efficiently take the place of an engineer?—I think not in all cases; in the general duties of supervision in the engine-room it would require a man of more resource than you might expect an engine-room artificer to have; a man of more general knowledge and greater reasoning power, and more able to meet casualties and that sort of thing.

3828. You mean then that whatever number of engine-room artificers you have in a ship, you would always wish to see a body of highly educated engineer officers?—Undoubtedly.

3829. Why do you think it requires six artificers to take the place of four engineers?—I merely suggested that as an increase in the working staff.

3830. But you would gain an increase in the working staff by having four engine-room artificers, and a rather more powerful one, that is to say, more accustomed to tools than the present engineers?—An engineer being possessed of better reasoning power would lay himself out for general work better, whereas an engine-room artificer would localise himself more as it were, and would confine himself to his tools; that is why I suggested that a larger number might be necessary.

3831. What trades would you introduce amongst the artificers?—Fitters principally.

3832. Supposing you had six artificers in a ship like the "Sultan," what proportion of trades would you have?—4-6ths fitters, and the other boiler-makers.

3833. Do you think that a fitter could carry out the work of a boilermaker on board ship?—He could do it, although probably he would not be well conversant with it; still he might be easily put in the way of it. I should think that a fitter would be more capable of doing a boilermaker's work than a boilermaker would be of doing a fitter's.

3834. Have you been shipmate with the engine-room artificers?—One of them.

3835. Where was that?—In the "Cadmus."

R

C. J. Martin,
Esq., R.N.
28 Oct., 1875.

(3572)

C. J. Martin,
Esq., R.N.

28 Oct., 1875.

3836. What trade was he?—A fitter.
3837. Was he a good man?—A very fair man.
3838. Did he keep watch in the stokehold?—He kept watch in the stokehold when working at high speed, at other times there being three engineers he was not required; in case of an engineer being sick he kept engine-room watch.
3839. Did he keep watch in the engine-room?—Yes, when going at low speeds.
3840. Were you chief engineer in the “Cadmus”?—Yes.
3841. Not engineer in charge?—No, chief engineer.
3842. Did the other three engineers keep watch?—Yes.
3843. Do you think it requisite to have a blacksmith amongst the engine-room artificers?—Not an ordinary blacksmith; a percentage of men thoroughly acquainted with engine-smithing, I should think, would be a very valuable addition.
3844. Should you wish to have one, or do you think that a boilermaker would do the work?—The boilermaker would do the work.
3845. Is a fitter ever a smith?—In some cases you may meet with fitters who have passed through the smith's shop and have a fair knowledge of smithing.
3846. Had you any stoker mechanics in the “Cadmus”?—Yes, one.
3847. Was he a blacksmith?—No, a boilermaker.
3848. Where did he learn his trade?—In Devonport dockyard.
3849. Was he a blacksmith at all?—Not what you would call a well qualified blacksmith, but what you would call a handyman for a rough job.
3850. Was there a ship's blacksmith?—Yes.
3851. What sort of man was he?—He was a man that understood smithery, he had been brought up to it, and was a properly qualified man.
3852. As a smith?—Yes.
3853. Did he understand anything about the interior of the boilers?—Not the slightest.
3854. But he was ready to assist, supposing there were any repairs that required smiths' work in the boilers?—Yes.
3855. Did he ever do work for you?—I think he did on one or two occasions.
3856. Where did the engine-room artificers mess in the “Cadmus”?—With the master-at-arms.
3857. Was there anyone else with them?—The sergeant of marines and the ship's steward.
3858. Those four formed the mess?—Yes; I am not quite certain about that, there may have been a ship's corporal.
3859. Was he satisfied?—He frequently complained.
3860. Of what?—Of want of sleeping accommodation and the small mess and room; perhaps that was more on account of its being a small ship.
3861. Did he sleep in a hammock?—Yes.
3862. On the lower deck?—Yes.
3863. Could you improve his condition at all?—No, not at all.
3864. You did not see your way to it in that ship?—No.
3865. Do you think that the best arrangement was made for him to mess with the master-at-arms?—In that ship no other arrangement could well have been made.
3866. Did he make any other complaint besides that of his mess place being small and his sleeping place uncomfortable?—He once or twice complained about the master-at-arms interfering with his leave.
3867. Did he ask leave from you whenever he wanted it?—Yes, always.
3868. I suppose you could sometimes spare him when the rest of the ship's company could not get leave?—They had leave specially on first going into harbour, but he was generally required then.

3869. Where did he wash?—In the stokehold.
3870. Had the stokers a wash-place?—There was a bath-bay at the end of the stokehold, but nothing more than a part of the stokehold.
3871. Was there a washand-basin or bath?—Neither. It was only a little bit of a bay at the end of the stokehold; merely an extension of the stokehold.
3872. You had three engineers in the ship?—Yes.
3873. Did they mess by themselves?—Yes.
3874. If you think it desirable to enter engine-room artificers in lieu of a portion of the engineers, do you think that the present regulations will enable us to get good men?—I hardly think so.
3875. What would you suggest?—An increase of pay; 5s. 6d. a-day on entry, and then progressive so as to induce properly qualified men to come in and remain.
3876. What should their pay be, at the end of ten years?—I think they ought to be entered for twenty years.
3877. We do not do that to any other class, you know?—I think it would be advisable to do it with them because they become qualified men at the end of ten years, and strong inducements are held out to them to leave the service, and they frequently do so.
3878. Should you think it desirable to retain them in the service after the end of ten years by an inducement such as pension or better pay?—I should think it would be advisable to hold out inducements for a man to remain in the service over ten years.
3879. Do you think those inducements should be in the way of pension, or pay, or what?—Progressive pay and pension.
3880. Would you alter their position after ten years, and make them warrant officers?—No, I would retain them in the same rank as that in which they entered.
3881. What pension do you think they ought to look to?—After 20 years' service, I think that the minimum pension should be £55 a-year.
3882. The pension they get now is £52 a-year?—Is it?
3883. You do not think that is sufficient?—I thought it was about £50. I was not aware that £52 was the exact amount.
3884. Would you rather have men from the Government factories, or from the private trade?—I do not think it would matter at all, so long as they were properly qualified men.
3885. Where was your artificer educated, or do you know from where he came?—I think he came from Cornwall.
3886. In the private trade?—Yes.
3887. Where did you serve your time?—At the Great Eastern Railway at Stratford.
3888. Had you had anything to do with marine engines before?—The latter part of the time I had on repairs.
3889. What age were you when you entered the service?—Nearly 22 years of age.
3890. Had you had the management of engines at all when you entered the service?—No, not in charge of them. I had been out occasionally steaming and on trial trips.
3891. What was your first ship on joining the service?—The “Penelope” paddle frigate.
3892. Did you keep watch in the engine-room immediately on joining her?—I kept stokehold watch for about the first six months; a senior engineer falling sick, I took his watch for the time being; during the remaining portion of the time I was in the ship nine months.
3893. Were you on the coast of Africa?—I was in the Baltic.
3894. (Captain Commerell). With Captain Caffin?—Yes.
3895. (The Chairman). Were you in her when she got ashore under the fort at Bomarsund?—Yes.

3896. Do you know the present regulations for the entry of engineer students?—I cannot say that I am intimately acquainted with them, but I think I know the outlines of the system.

3897. Do you know how they are selected for entry?—By nomination, I believe.

3898. By whom?—By the admiral of the port.

3899. You are not aware that any one can offer himself as a competitor for entry?—I am aware that it is open to public competition.

3900. Then how do you mean they are selected by nomination?—I believe they are nominated by the admiral of the port before they are allowed to compete.

3901. They are put down in the list, but no selection is made?—Selection is made by competition.

3902. The competition is open to anybody or any class of society?—Yes.

3903. Do you think that it is a good system?—No.

3904. Why?—I think they should be nominated by the Admiralty: because there are local influences preventing the entry of a better class.

3905. That they should be selected from a better class?—Yes; they should be selected from a better class.

3906. Have you ever been thrown into intercourse with the engineer students in the dockyard at all?—No, I have not.

3907. You have no information to give as to the mode of training them in the yard?—I have been away during the last six years, and I have not seen the system at work. My information is principally derived from hearsay.

3908. Have you any suggestions to offer to the Committee beyond those we have talked over on on the position of the chief engineers and engineers, and the inspectors of machinery in the service?—I think with a view of improving the condition of the engineer class generally, a large number of old engineers should be retired, and considering their disappointment in not being promoted to the rank of chief engineer, some fair pension should be offered to them to go. I do not think that any engineer ought to be promoted to the rank of chief engineer over 40 years of age, and all those men who have attained 45 years of age, should have a fair and liberal pension offered them to go. That would be one means of reducing the present body of engineers, and giving a chance of promotion to the young men who are coming on.

3909. What should they be paid?—I think it would be fair if they were allowed 6*d.* a-day for every year's sea service as an engineer. I think, considering that there is so little chance of promotion, the pay of an engineer passed for chief ought to be made progressive to 13*s.* a-day.

3910. Depending upon their length of service?—Exactly; that should be the maximum.

3911. At what age do you think a man should be promoted to the rank of chief engineer?—I think 35 years of age is quite late enough to be made a chief engineer, considering the nature of the duties in the present type of ships.

3912. Have you any suggestion to make as regards the inspectors of machinery?—I have never given much thought to that. The position of an inspector seems almost beyond my reach, and I have never considered the question further than the position which (especially in the reserves) is a very responsible one, and somewhat underpaid.

3913. Why is it beyond your reach, if you have been promoted below the average age at which men are promoted now?—There are so many men senior to me, that it is impossible for me to have a chance.

3914. The age for promotion is getting older every day?—Quite so.

3915. What pension do you suppose would induce engineers of over 35 years of age to retire; do you think that 6*d.* a-day would?—I think that 6*d.* a-day

for every year's sea service would be a fair remuneration, and an inducement.

3916. For the older engineers that would make their full pay?—Yes, on the present scale.

3917. If 6*d.* a-day for every year's service were offered to the whole body of engineers, do you think that the old or the young ones would go in greater numbers?—I think that a large proportion of the young men would go; they would see that their chances of promotion were small, and would, having youth, and a small pension, try their fortunes elsewhere.

3918. Of those young men, do you think that the best or the worst would go?—The best of the young men.

3919. Then do you think it would be desirable to limit that optional retirement to the upper half of the engineers?—Yes, with a due regard to a reserve of experienced men being kept.

3920. What do you think of the uniform of the engine-room artificers?—I think that there should be an improvement made in it; that they should have a coat of some description, and some working uniform for them on board ship. At present, the system seems to be to wear almost anything; you may go into half a dozen different ships, and see half a dozen different uniforms, fearnought, canvas, and so on, they have no proper working uniform.

3921. Are they not compelled to wear canvas?—I think they are allowed a canvas suit.

3922. Why not make that their working dress?—It could be made so, but I think they ought to wear something better than that. Considering their position, that they have the charge of things, and the direction of other men, I think they ought to have a more suitable dress.

3923. Is it not important to impress upon them that they are working men?—Very important indeed; most important.

3924. And their working dress should be a *bond fide* working dress?—Yes.

3925. (*Captain Commerell.*) Are they not allowed a suit of fearnought?—Yes; that is drawn from the engineers' stores; that is for going into boilers, and so on, lying down in the bilges, and that sort of work.

3926. (*The Chairman.*) What dress do they usually wear?—A lot of old clothes without any regard to appearance.

3927. What dress do the stoker mechanics wear?—Canvas suits or old duck clothes.

3928. What dress would you recommend for the artificers?—A suit of serge would be very useful, a jacket.

3929. What sort of jacket?—A short close fitting jacket for engine-room duties.

3930. Have you had any experience at all lately in the workshops of the steam reserve?—I have not.

3931. Not of late years?—No.

3932. (*Mr. Wright.*) Did you ever mess in the gun-room or ward-room before you were promoted to the rank of chief engineer?—Yes, in the "Teazer."

3933. (*The Chairman.*) Who commanded her?—Captain Bloomfield.

3934. (*Mr. Wright.*) Would you prefer messing in the ward or gun-room, to messing in the engineers' mess?—Yes, in that ship decidedly.

3935. Would you as a rule in all ships?—Yes.

3936. Do you think that the engineers generally would prefer that?—I think they would certainly.

3937. Do you think that they would be able to afford the expence?—Provided that they were given an increase of pay, I think they would.

3938. How much increase of pay do you think it would be necessary to give them?—Provided that a scheme of pay was carried out which progressed up to 13*s.* a-day, then I think they would be quite capable of doing it.

3939. (*Captain Commerell.*) With regard to an engineer of five years' standing, would you sooner

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see him for the first five years messing in the gun-room or in the ward-room; I do not mean as regards his own comfort, but for the general efficiency of the service?—I think for the first five years he might mess in the gun-room. I would rather extend it to eight years; after eight years, I would make him eligible to mess in the ward-room.

3940. (*Mr. Covey.*) You thought that if 6*d.* a-day for each year's service were offered on retirement to the whole body of engineers, we should lose a great many of the young ones; what do you call a young engineer?—From 25 to 30 years of age.

3941. He could not join the service until 22 years of age, and he would not have much time. At what age do you think he would retire on that 6*d.* a-day for every year served?—That would depend on his circumstances; probably at any age up to 40.

3942. Then he has been 18 years in the service?—Yes.

3943. From what you have seen yourself, do not you think that when inducements are held out to people, they are not over eager to let them slip through their fingers, and they do not throw up a chance too quickly. Do not you think that a man would stop in order to get his maximum retirement?—If you could arrange a maximum retirement, perhaps so, but I thought you wanted to get rid of the men, and I was asked at what age I thought a man would go if his retirement were made optional. I said that I thought the young men would go and

try their chances elsewhere. A man would have a probability of getting something to do at 25, that, perhaps, he would not get to do at 35 years of age.

3944. When outside he has to make his way up again?—In most cases he has. I am supposing that he has been disappointed in the service; he takes what little he can get, and goes elsewhere to try his chance of improving his position.

3945. (*The Chairman.*) When you entered the service, how soon did you expect to be made a chief engineer?—I thought in about ten years; the average time was about eight years and a half.

3946. (*Captain Dowell.*) How many years were you in the service before being promoted?—16 years.

3947. (*Captain Commerell.*) The time has increased very much?—Yes.

3948. (*The Chairman.*) Do you think that the engineers would consider it a great boon if their retirement were called "retirement" instead of "pension"?—Yes.

3949. Is it because it sounds better, and gives them a more dignified position, or what is their objection to being pensioned?—They object to the title of "pensioners," and prefer that of "retired naval officer."

3950. If they were retired, would they consider it a boon to get a step in rank?—Probably some would value it.

(*The witness withdrew.*)

WILLIAM HOLLOWAY, Esq., R.N., called and examined.

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3951. (*The Chairman.*) You are a chief engineer?—I am.

3952. Of what standing?—1871 four years.

3953. Where are you serving now?—In the "Enchantress."

3954. How long have you been in her?—Three years.

3955. What ship were you in before that?—That is my first ship as chief.

3956. What ship did you serve in before that?—In the "Minotaur."

3957. As senior engineer?—Yes.

3958. How long were you in her?—For four years.

3959. How long had you been in the service, when you were promoted to chief engineer?—For 18 years.

3960. At the time you entered the service, how long did the men remain engineers before they were promoted to the rank of chief?—From 8 to 9 years.

3961. What pay did you receive in the "Minotaur"?—10*s.* a-day, because I had only five years' standing.

3962. Had you no allowances?—No, nothing at all.

3963. Did you receive 10*s.* a-day during the whole time you were in the "Minotaur"?—No, 9*s.*, till an advance of 1*s.* per day was given to engineers of five years' standing.

3964. Had you any engine-room artificers in the "Minotaur"?—Several during the time that I was there.

3965. What number at one time?—I am not quite positive whether it was three or four.

3966. You are now in the "Enchantress"?—Yes.

3967. Have you any there?—There is a blacksmith borne expressly for looking after the steam cutter.

3968. Is he as good a blacksmith as he could well be?—Yes, a very good man indeed as a blacksmith.

3969. Has he served his time as a blacksmith?—He served his time in this dockyard.

3970. Was he ever a stoker in the service?—He joined as an artificer, and was in the "Lord Warden" for three or four years as a smith.

3971. Is he an engine-smith?—He is a very excellent smith.

3972. Is that his trade?—Yes; I am not quite positive whether he served his time here, but I believe he did.

3973. Does he work the engines of the steam pinnacle?—Yes, and keeps them in very good order too; he takes them to pieces and does all the packing when it is required under the supervision of the engineer.

3974. Where did he learn it?—In the "Lord Warden," I think; he was recommended by Mr. Oliver to take charge of the Admiralty pinnacle.

3975. Had you men of all trades in the "Minotaur"?—We had a boilermaker and two smiths.

3976. No fitter?—No; there was no fitter in the "Minotaur."

3977. Have you ever had a fitter?—No, never in any ships I have been in. Those men in the "Minotaur" were very good smiths, but we had a handy stoker that could do everything equally as well as the smiths; the boilermaker was of course a most useful man.

3978. What trade do you think is the most useful to you in the engine-room?—Every ship should have one or two boilermakers and the other fitters, no doubt of that.

3979. Supposing you had four artificers, of what trades should you say they ought to be?—Three fitters and one boilermaker; because the boilermaker is usually a smith too.

3980. If you had three fitters and one boilermaker, you would not think it necessary to have a smith?—No.

3981. Have you had any experience of blacksmiths in ship work?—Only in the "Minotaur"; we had blacksmith's work occasionally, but the men in the service (the stokers) generally did what we had to do in that way.

3982. Was the ship's blacksmith a better man than the stoker?—The man we had as ship's black-

smith was a very good man, but he might have been an exception to the general run.

3983. Where did the engine-room artificers in the "Minotaur" mess?—On the main deck, I think, with the petty officers.

3984. The chief petty officers?—The gunner's mate, carpenter's mate, and boatswain's mate.

3985. Did the master-at-arms mess with them?—No.

3986. Do you think they should mess by themselves?—Yes.

3987. Did you hear of any complaints in that ship about the position of the engine-room artificers?—Continually, and more especially with respect to their messing; they had to take their turns in the mess, and when we wanted them down below to their duty they would be cleaning the mess up; That was represented to Captain Goodenough, and it was partly done away with.

3988. Was any change made in the messing?—No.

3989. Where do you recommend that the separate mess should be?—If we could only get the engineers' mess done away with, I would let them have that.

3990. You would actually put them into the engineers' mess place?—Yes, if you put the engineers into the ward and gun-rooms.

3991. Supposing it is deemed impossible to do away with the engineers' mess immediately, is there any suggestion you can make as to their messing?—They should mess by themselves.

3992. Is there any place in the "Minotaur" where they could be put under the supervision of the engineer department only?—Not on the main deck; the engine-room flat would be too warm, and the next flat too dark; the only place I know of is in the condenser room or rather the tank room above the condenser.

3993. Is not that sometimes rather hot when condensing?—Not more than 70 degrees, I think.

3994. Had you any complaints on the part of the artificers about their chests, or their dress, or their leave?—Not about their chests, because it was a very large ship and there was plenty of space, so no question arose about that.

3995. Do you remember the size of the chest?—I do not exactly; I think they have had their chests altered; an order came out that they were to be made smaller; I have heard them complain about their short jacket.

3996. What do they want?—They want a tunic the same as that of the master-at-arms, and the people with whom they are supposed to rank.

3997. As they rank with the chief petty officers would they like to have a similar dress to that which the chief petty officers have?—No; I think the engine-room artificers look upon themselves in a different light; there are very respectable men amongst them, and they have an idea that they are better than the sailor chief petty officers; there was another question which used to arise, and that was the interference which they received from the other chief petty officers, the master-at-arms and so on; the engine-room artificers were a new class, and the master-at-arms used to interfere with them.

3998. In what way?—In the matter of messing and also about leave; they used to come to me about it, and I might have been continually running to the commander if I had chosen to do so; I suppose it was jealousy.

3999. Did they always ask leave from the engineer department?—Yes, always; I used to make out the leave list every day.

4000. When they had leave from the engineer department, was there any difficulty about their getting on shore?—Yes; the mess had not been cleaned or something had not been done.

4001. Do you think that their complaint about their dress is reasonable?—I have seen some men who were as big as I am with a jacket on and I do not think that a jacket would look well on them.

4002. Do you think that their pay is sufficient to enable us to get good men?—You will never get what are termed first-class fitters for it, because they are men who can get 6s. or 7s. a-day outside; at Woolwich Arsenal they are giving the men 8d. and 10d. an hour.

4003. Working by the job?—Yes; I think it is all by piece-work now there; they allow them to make that; I think that the standard in this yard for first-class men is as much as £2 a-week.

4004. (Captain Dowell.) Do you know what engine-room artificers are receiving?—Yes; 5s. a-day on entry, and 5s. 9d. a-day after three years.

4005. That is for seven days in the week?—Yes, but the parties in the dockyard are on shore on Sundays and have home comforts, the other men are on actual duty on Sunday.

4006. (The Chairman.) Not when employed in the steam reserve?—No.

4007. You think that the pay of an engine-room artificer should rise to that which a first class fitter receives at least?—Yes, I think it ought to rise periodically; my idea is that they ought after 10 years' service to get 7s. 6d. a-day, and after 15 years to come up to 8s. a-day, I think that would be satisfactory, with the addition of a pension in view; I have spoken to one or two of them about their grievances, and I find that the dress question seems to be rather a vexed one, and also the mess, and I think if they could get a little additional pay they would be perfectly satisfied, that is, for the class of artificers you are getting in the service at present; if you want a superior class of men, I question whether they would come.

4008. From your experience of engine-room artificers generally, do you think that they are satisfactory men who earn their pay?—I have no doubt they do, but I have never had one that I could trust to do a job except under supervision.

4009. Have you ever had a fitter?—No.

4010. I suppose we may consider that the fitters are the best workmen?—Yes; the fitters on shore will not associate with the boilermakers and blacksmiths.

4011. Do you think it would be easier for a fitter to do boilermaker's duty, than for a boilermaker to do a fitter's duty on board ship?—If on board ship with only one artificer, I would choose a boilermaker, because a boilermaker has his own speciality, and after being trained a little while, if he be a man of common sense, he would be able to do little things in the engine-room; of course if anything particular turned up he could not do it; it is now more than four years since I have been in a ship to come in contact with an artificer.

4012. Do you think it will be desirable for any reason to reduce the number of engineers in a large ship like the "Minotaur," and increase the number of engine-room artificers?—Yes.

4013. What complement would you suggest for the "Minotaur"?—In the "Minotaur," I think, 4, more especially for engine-room duties; 3 watch-keepers and a senior; there is a large department outside the engine-room; say 5 engineers, 4 besides the senior, and make the rest of the complement up with artificers, 4 or 5 artificers.

4014. What advantage would result from decreasing the number of engineers?—In the first place, you would not have so many engineers in the ship, and you would do with less room, they would not want a large mess berth, and eventually as the seniors went into the gun-room or ward-room, you would be able to do away with the engineers' mess entirely; the pecuniary point would be very small.

4015. Do you think it would expedite promotion?—Yes; if you could do away with half the number of engineers.

4016. It would expedite promotion eventually?—I had been 18 years in the service when I became chief engineer, and I expected to get that rank in

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eight years. I was in charge of a ship in China for five years.

4017. What ship was that?—The "Swallow."

4018. Where did you mess there?—In the ward-room.

4019. How many engineers were there in that ship?—Two besides myself.

4020. Did they mess in the ward-room?—They had their own mess.

4021. For how many years did you mess in the ward-room before you became a chief engineer?—For five years. I came into the "Minotaur" and lost my 1s. a-day charge money, my cabin, and had more work to do than any other man in the ship, and nothing to make up for it.

4022. Would you like to see the engineers promoted by selection instead of by seniority entirely. Do you think it would be an inducement for men to work as you did yourself, with the idea that the work would be recognised?—Yes; but it is always open to jealousy. I cannot term it abuse, because naval officers of rank are above that sort of thing; it would create jealousy amongst other officers of equal seniority, who may, perhaps, consider themselves of equal ability, though not so in other people's eyes.

4023. Would not the opinion of a man's ability be obtained a great deal from the chief engineer?—I do not like to give an opinion upon the question of selection, but I am quite aware, that in my case it would have been a good thing for me.

4024. Would you recommend any alteration in the pay of engineers?—I believe that you have a pamphlet before you, called "The case of naval engineers," I agree with that, and I think that it represents our grievances fully and fairly; I think the scale proposed is a fair one, with the exception perhaps of that suggested on first joining the service. I am getting 12s. a-day now, and if I were paid by seniority I should be getting 17s. or 18s. a-day. If I were to retire now, after 22 years' service, I should get 6s. a-day to retire on, according to my reading of the circular.

4025. (*Captain Dowell.*) What will you retire upon at 50 years of age?—About 8s. a-day, I think.

4026. Will you count then your 11 years?—If I do not have any more half-pay time I shall barely get in my 11 years at 55 years of age.

4027. If you counted all your junior time, how much service would you have now?—Nearly 22 years. I have been in the service 22 years next January, and 14 years of that time out of England.

4028. (*The Chairman.*) According to this pamphlet, the suggestion is 6d. a-day for every year that you have served?—That is for the engineers. I think that when a man gets promoted to the rank of chief engineer he ought to have some little advantage, the same as the scale laid down for medical officers. A medical officer promoted has an addition to his pay above what he is entitled to for his service in the junior rank. I think that our case is very hard; it is not for myself alone, but it applies to nearly the whole of the men who have been promoted during the last two years, and all those that are likely to be promoted. I was 42 years of age when promoted, and the age now is running up to 45 years.

4029. Are you aware of the regulations for the entry of engineer students in the service now?—Yes; and I have got my opinion upon that. I think that nomination ought to be introduced, in order to get a more respectable class of youngsters to join the service.

4030. During the last ten years, or more, engineer students have been admitted from any class of society, have they not?—Yes; but I think the class has been confined principally to the people living in dockyard towns, and to the dockyard men's sons and boys from Greenwich school, which has not had a good effect upon the service.

4031. No social class has been excluded?—No,

none; while classes of a certain standing find the social standing of the boys admitted so much below their own they will not compete.

4032. So that the system has been tantamount to excluding a higher social class from coming in?—Exactly so.

4033. That being the case, as those men are coming on to enter the service, do you think it is possible they could be admitted into the gun-room mess at once?—There are many that have the germs of goodness in them, and by contact with people belonging to a better class than themselves it would improve and polish them. I am aware of the difficulty, but I do not think it is so great as is generally supposed. A boy must have ability to pass the examination which is laid down, but still there are the social surroundings of the boys, which clings to them.

4034. In addition to their origin, during the six years of their training they are still living at their homes, and amongst their families?—They cannot get clear of their antecedents. If we could get boys away from the dockyard towns, I think it is very likely we should get a better class. I know a case in point. There is a man, who is in a convict prison, a warder, who has got a boy as student in the dockyard. That boy lives with his family, and, if a respectable boy, and when he gets into decent society, he will be ashamed of his parents.

4035. Have you any sons?—I have one.

4036. Would you put him into your own profession?—Certainly not, to labour under the disadvantages that I have laboured under.

4037. Whatever alteration was made in the pay and promotion in the service, if the present regulation for entry be continued, would you put him in?—When a man has got a large family he is very glad to take advantage of the means that fall in his way, but I would not do it from choice. There are very excellent exceptions to the rule I spoke of in the cases of boys admitted.

4038. Do you think that the training which they are getting at Greenwich college is an advantage?—A very great advantage.

4039. If the students are recruited from a higher class of society, would you wish to see them reside and mess in a building inside the dockyard?—That opens up a large question. Directly you do that you must have them under martial law, or something closely approximating to it. Where a lot of young fellows are living together in a dockyard they must be under strong restriction, and that would be entering into a very large question.

4040. Where did you serve your time?—At a firm near London. Then I was at Penn's for three years.

4041. (*Captain Commerell.*) Do you think that the engineers of the profession would be satisfied if the pay of inspectors of machinery, chief engineers, and engineers was assimilated as near as possible to the pay of the other branches of the service?—Yes, I think so; speaking for myself, yes, more especially if assimilated to that of the medical department. At the same time I think that, taking the age, you will find the scale does not exceed what the paymasters have at present, and in the higher grades it does not certainly come up to it.

4042. Can you tell us whether that scheme is drawn up with reference to the ages of chief engineers and engineers at present, or that which we hope to bring them to?—As at present.

4043. If you take off seven years from a man's time, as an engineer, would he be satisfied with so much less proportionately?—Then you would not be putting him on an equality with the other classes, such as the paymasters and doctors.

4044. Do you think that the profession, taking into consideration the relative ages when promoted, would be satisfied if they were put on the same footing as other classes of officers?—I have no doubt they would.

4045. Where serving five years more in one class you should have the same advantages at the end of five years and eight years, and so on?—Yes.

4046. Are you aware that in preparing for the medical service the officers have been at a considerable expense in their own education, coming in at a later age?—Yes, as compared with the students, but not with a large proportion of the officers now in the service, who have served their time, and in many cases have paid large premiums, quite equal to the amount paid by the medical profession. They have served their time at their parents' expense, and have brought the knowledge which they gained outside into the service for the good of the country. Those are the men who expected when they joined the service to be promoted within a reasonable time, and who, unless they had thought that would have been the case, would never have joined, or at any rate would not have stopped in the service.

4047. (*The Chairman.*) You say that it is desirable to reduce the list of engineers, in order to enable you to get a good flow of promotion?—Yes.

4048. And to do that, you think it will be necessary to offer retirement for those engineers to go?—Yes; the chances of a man who came into the service expecting to obtain promotion, are now *nil*.

4049. Do not you think that if a higher scale of pay were adopted, it would prevent many engineers accepting a reasonable retiring allowance?—I quite understand the difficulty; if there were a moderate additional allowance made to men on the list above a certain age, and they had the option allowed them of retiring on £130 or £140 a-year, if under 40, and it were said, "If you serve till you are 45 years of age, you shall get 10s. a-day," there is no doubt you would clear the list. It is thought if they could get 6d. a-day for each year served, they would go; there is a great number of men who would not pass for chief engineers, and I do not believe that they would think over the matter a minute; they would go if they had the chance of going, because their seniority is no good in the way of promotion.

4050. According to this scale, those men who are at the head of the list, would get 15s. a-day as engineers, and they would have to go upon 8s. 6d. a-day?—Yes.

4051. Would they go upon that?—Yes; I have no doubt about it.

4052. If they were offered 15s. a-day full pay?—But there are so many that have not passed. I do not think that the people who are at Greenwich would. Perhaps when you got down the list you might find some difficulty, as the younger engineers have more chances of getting on.

4053. If arrangements were made to expedite promotion, do you think that a good many more men would qualify for chief engineers than is at present the case?—All the present youngsters coming into the service must qualify on entry; nearly the whole of the men who are likely to qualify for chief engineers have already done so.

4054. You do not think that under any circumstances that many would come forward?—I think it would be very few indeed; I do not think you would get a dozen; besides, most of them are getting men of from 40 to 45 years of age, and I do not think they would care about going into mathematical questions at their time of life.

4055. Do you agree with this scale of pay for inspectors of machinery?—It is months since I read it, but that position is so far beyond my reach that I have not looked at it.

4056. (*Captain Dowell.*) Do you agree with the pay of 9s. at the time of entry?—I think if you wrote 7s. instead of 9s. it would be very fair.

4057. (*Mr. Wright.*) Were there two chief engineers in the "Minotaur"?—Yes, when we were first commissioned.

4058. From your experience of that, did it work well, do you know?—No, it did not.

4059. What was the reason?—I suppose it is in human nature to be jealous, and a man at the head of a department does not like another put on an equality with him.

4060. You would not recommend two chief engineers being appointed to any ship?—No; for more reasons than that; a junior chief engineer under the present regulations would be an elderly man, and the senior engineer has not quite had all the energy taken out of him, and he may work in the hope that it may get him promotion, while the other man has not that incentive; it was tried in the "Minotaur," and did not answer.

4061. You say that you think the number of engineers might be considerably reduced; do you think that if the number of engineers, and of skilful officers were to be reduced, and their places filled by less skilful men, such as engine-room artificers, the machinery of a ship would be likely to suffer, more especially as it is now getting more complicated than it used to be?—I think we ought to have more fitters in the large ships, men of better skill; I think it is almost time; we shall never be the respectable class required, or the important class we expect to be, until the officers have no occasion to take hold of a hammer and chisel; you should of course have officers able to supervise. I have had to work a great deal in the service, and it did not raise me in my own estimation or in the estimation of other officers.

4062. (*The Chairman.*) Do you think it would be an advantage to increase the number of chief engineers in the service?—Yes.

4063. For the sake of promotion?—Yes; I think there ought to be a chief engineer in every ship commanded by a commander.

4064. With regard to your answer to Mr. Wright, do you think if a man were promoted to the rank of chief engineer much younger, say at 35 years of age, and his pay increased, there would be any objection then in having two chief engineers in large ships?—I do not think it would answer, and I do not think it is required; if I am not fit to go on board a large ship and take entire charge of the machinery, I have no business to be in the position of a chief engineer at all.

4065. Did it ever strike you that it might be desirable to have two classes of chief engineers?—No, it did not.

4066. I mean two classes of chiefs, the second class to be put in small ships, and the first class for large ships?—Yes, quite so, but I do not see the necessity.

4067. Would you like to retain the term "assistant engineer" or not?—I would like to see the term "assistant engineer" done away with after a probation of twelve months or two years.

4068. What advantage would that be?—No special advantage that I know of, but he would be called what he really was, an engineer and responsible officer.

4069. Do not you see some advantage in having a step of promotion from one rank to another?—No, I think the term of years for increase of pay is tantamount to it.

4070. You see no reason for making a change in rank, but would have one uniform rank?—After 12 months, when a young fellow had served his probationary time, he would be entitled to his step, the same as others, that would give a great deal of gratification to all in the junior branch.

W. Holloway,
Esq., R.N.

28 Oct., 1875.

(*The witness withdrew.*)

CHARLES WEBSTER, Master-at-Arms, called and examined.

C. Webster.
—
28 Oct., 1875.

4071. (*The Chairman.*) You are master-at-arms of the "Monarch," I believe?—Yes.

4072. How long have you been in her?—For nine months.

4073. What ship were you in before?—The "Resistance."

4074. As master-at-arms?—As first-class ship's corporal.

4075. Was she a coast guard ship?—In the channel squadron.

4076. (*Captain Dowell.*) Did Captain Brown command her?—Yes.

4077. (*Captain Commerell.*) Was there an engine-room artificer of the name of Trim in her when you were there?—No.

4078. (*The Chairman.*) What number of engine-room artificers have you got in the "Monarch"?—Four.

4079. Have you any trouble with them?—No, the only difficulty which occurs is relative to their messing; there are difficulties of that description occurring at times in the "Monarch."

4080. With whom do they mess?—All the chief petty officers mess together, with the exception of myself, the writer, the ship's steward, schoolmaster, chief boatswain's mate, chief gunner's mate, and the four engine-room artificers.

4081. (*Captain Dowell.*) Does the chief carpenter's mate mess with them?—No.

4082. (*The Chairman.*) They do not agree together, do they?—No; the difficulty is this, the difference of pay; for instance, engine-room artificers have a great deal better pay than the chief boatswain's mate and the other seamen, chief petty officers; the consequence of that is, that the engine-room artificers wish to live much better than the chief boatswain's mate and the chief gunner's mate can afford to live, and therefore difficulties arise. Again, the ship is at sea in the summer months, and the rig of the day may happen to be white clothing, the consequence is, engine-room artificers frequently come up into the mess in their dirty things, and it is not possible as a rule for the executive chief petty officers to go in on account of having their white clothing on.

4083. The complaints are more on the part of the executives than of the others?—Yes.

4084. Is there any trouble about cleaning the mess?—We have had a slight difficulty of that description in some ships, the "Resistance," for instance; we had an ordinary seaman excused to attend upon them; on my present ship there are two boys who are excused till 9 o'clock in the morning, after that they have to attend to themselves.

4085. What duty have the engine-room artificers to do in cleaning the mess?—None whatever.

4086. Do they ask you for leave?—We have a leave-book, the names of all chief petty officers are placed in that leave-book every day at noon by the master-at-arms, and when permission is obtained from the commander to leave the ship, they have simply to tell the master-at-arms when they are going.

4087. Do they on any occasion have to wait for the ship's company before they can go on shore?—No; they go directly they have leave; whatever leave they wish to ask for they place on a slip of paper which is handed to us, that is given to the Commander, and if they have the leave of their departmental officers they go.

4088. Is there plenty of room for them to mess?—There are no complaints upon that ground.

4089. Where did they mess in the "Resistance"?—They had a screen rigged before the bulkhead on the main deck, and they messed below that.

4090. Under a canvas screen by themselves?—Yes;

there were two engine-room artificers, the school-master, chief boatswain's mate, and chief gunner's mate.

4091. Is that screen kept permanently there?—It is rolled up at divisions only.

4092. Where do the engine-room artificers mess in the "Monarch"?—In the turret-room on the lower deck.

4093. Have you heard any complaints about the size of their chest?—No: in addition to the chest they have lockers for the purpose of keeping anything in they wish.

4094. Has each chief petty officer a locker?—There is one for each of them.

4095. What is kept in the locker generally?—Their working clothes.

4096. Do you know anything about their washing arrangements?—In all ships they have the use of the ship's company's bath-room.

4097. Do you suppose that they have access to it whenever they want it?—That is the order.

4098. But suppose the ship's company is using it?—The ship's company generally use it in the evenings, and the engine-room artificers generally wash in the afternoon, at 3 or half past 3 o'clock.

4099. (*Captain Dowell.*) At the end of each watch?—Yes.

4100. (*The Chairman.*) Did you ever have to take any engine-room artificers on the quarter-deck?—No.

4101. Have you known any trouble with them in the "Resistance," or anywhere else?—On one occasion there was an engine-room artificer away in the launch, who was unfit for duty, that was the only case I know of.

4102. Have you any suggestions to offer as to the way in which the artificers should mess?—In the "Monarch," during the last commission, they messed by themselves; that is to say, the civil chief petty officers together, and the executive chief petty officers together; and that was found to work amongst themselves much better than at present; what I call the executive chief petty officers, are the chief boatswain's mate, and the chief gunner's mate, and the chief carpenter's mate; I call myself a civil chief petty officer.

4103. The other civil chief petty officers and the engine-artificers mess by themselves?—Yes. This commission they are messing on the lower deck with the ship's company. We have a separate deck in the "Monarch" for the use of the stokers and engine-room artificers, and they occupy the foremost place on that deck.

4104. Do you think that a good arrangement?—Yes; and they would sooner mess on that deck than on the lower deck, because they would be among their own people.

4105. Is it forward or aft?—Aft; last time they had it forward.

4106. Who is responsible for seeing that their mess place is cleaned?—The first lieutenant usually visits the mess deck.

4107. But under him, I mean?—I am.

4108. With whom should you find fault if it were dirty?—I should then speak to the chief gunners mate.

4109. Whom you look upon as the chief petty officer of the mess?—Yes.

4110. On no occasion would the engine-room artificers be found fault with for not cleaning that mess?—No.

4111. You say that in the "Monarch" during the former commission, the ship's steward, writer, school-master, and engine-room artificers messed together?—Yes.

4112. That is the same as at present, with the

exception of the executive chief petty officers being absent?—Yes.

4113. You think that the better plan?—I think it would be better for the engine-room artificers to mess separately.

4114. Would you rather mess by yourself, under any circumstances?—Yes; I could not do otherwise.

4115. Why not?—I should have perhaps unpleasant duties to perform, which if I were a mess-mate, I could not well do.

4116. What uniform do you wear?—My undress uniform is a jacket of this description, or a short jacket.

4117. What is that?—This is neither one thing nor the other; it is simply a jacket that I wear in lieu of my other; my best uniform is a single-breasted frock-coat.

4118. That is your full dress uniform?—Yes.

4119. What sort of thing is a tunic?—A tunic as we call it in the service, is the short jacket worn by the seamen.

4120. (*Captain Dowell.*) Is there any difference between your frock-coat and the seamen school-masters?—There is supposed to be; ours has 3 buttons on the cuff.

4121. Does the schoolmaster wear a longer coat than you do?—It is exactly the same length.

4122. (*The Chairman.*) When the artificers are inspected, they wear a short jacket, do they not?—Yes; on all musters.

4123. Have you heard them complain about their jacket?—No; I have never heard anything; but they wear a pea-jacket as a matter of more comfort.

4124. They are not allowed to go ashore in it, are they?—Yes; so long as they have a respectable dress on, or something approaching uniform, no notice is taken of them.

(*The witness withdrew.*)

ROBERT URQUHART, Engine-room Artificer, called and examined.

4130. (*The Chairman.*) Where are you now serving?—On board the "Crocodile."

4131. How long have you been in her?—Two years the 1st of last August.

4132. Is she your first ship?—No; I was in the "Malabar" nearly four years.

4133. When did you first enter the service?—7 years ago last June, in 1868.

4134. As an engine-room artificer?—Yes.

4135. Where did you serve your time?—At Messrs. A. and J. Inglis, of Glasgow.

4136. How long had you been out of your time when you joined the service?—Only a few months.

4137. During those few months were you in employ at all?—Most of the time where I served my time.

4138. What is your trade?—An engine fitter.

4139. What other engine-room artificers are there in the "Crocodile"?—Two; one is a blacksmith, and the other a boilermaker.

4140. In the "Malabar," what trades were they?—One boiler maker and two fitters.

4141. Is a boilermaker anything of a blacksmith?—Just at angle iron work or anything of that kind.

4142. What wages did you get at the time you left, after you had served your time?—30s. a-week for the first year or so, and then up to 35s.

4143. Did you come from Glasgow to Portsmouth on purpose to enter the service?—I came to Woolwich to enter the service.

4144. As what?—As an engine-room artificer.

4145. Why did you come to Woolwich?—Because it was the nearest port; I came across from Ireland to London, and then went from London to Woolwich.

(3572)

4125. (*Captain Dowell.*) You do not think that the chief carpenter's mate, chief boatswain's mate, and chief gunner's mate, bear any ill feeling towards the engine-room artificers because the engine-room artificers get more pay than they do?—No; I do not think that is so; sometimes unpleasantness arises because the engine-room artificers think that they are tradesmen, and therefore superior to the men who have been brought up in the service. Those sort of feelings would crop up at times, but not always.

4126. (*Captain Commerell.*) Whose fault is it generally if there is any squabbling among them; do the engine-room artificers put upon the blue jackets, or do the blue-jacket officers put upon the engine-room artificers?—The fault lies with the engine-room artificers, because they are not so amenable to discipline as men who have been brought up in the service, such as the chief boatswain's mate, chief carpenter's mate, and chief gunner's mate.

4127. (*The Chairman.*) Not so amenable to discipline through having been brought into the service so late in life?—Quite so; they are men who have been brought up from boys in workshops.

4128. (*Captain Commerell.*) Do you think it would cause any dissatisfaction amongst the engine-room artificers if they had no relative rank, but were first class artificers attached to the engine-room department, and were almost exclusively under the charge of the chief engineer?—I think that would be much better.

4129. You think that the engine-room artificers would forego the pleasures of rank for the more substantial benefits of better pay, and perhaps the absence of little discomforts that may arise at present?—Yes I think so.

4146. Where did you hear of the employment and the wages that were given?—I was in Ireland at the time.

4147. How did you hear of it?—I made an application to get into the service as an engineer, and the answer I got back was that no engineers were taken from private firms, and they sent me a circular; I think it was one of the first circulars issued.

4148. Did you write to the Admiralty?—Yes.

4149. Until you got that circular you had not heard of engine-room artificers being entered?—No, I had not, that was just about the first circular.

4150. Where do you mess in the "Crocodile"?—On the mess deck by ourselves, along with the ship's company.

4151. Is there no one else in the mess?—Yes, a man to attend to us.

4152. Is he a stoker?—Yes.

4153. Do you like it?—Yes.

4154. Does he clean your mess?—Yes.

4155. Do you sleep in a hammock?—Yes.

4156. Who takes it up and down?—The stoker; I pay him so much a month for doing it.

4157. Does the same stoker scrub your hammock?—Yes.

4158. What do you pay him?—4s. a month.

4159. He does not wash your clothes, does he?—No; if he does we pay him for it.

4160. When you saw the circular stating what an engine-room artificer would be required to do, you entered at once, did you?—No; I hesitated about it for some time; I wanted to get into the West India Mail Company, but as I wanted to get away from home just for the sake of going to sea, I had not

C. Webster.

28 Oct., 1875.

R. Urquhart.

28 Oct., 1875.

R. Urquhart. patience to wait for the other service, so I came on and joined this.
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4161. Did you keep watch at sea?—Yes.

4162. Where?—In the stokehold.

4163. Have you ever kept watch in the engine-room?—Yes.

4164. Have you ever had charge of the engine-room when under way?—I kept watch with the assistant engineer on the platform.

4165. Does it require two men to start and stop the engines?—There are about four men on the watch.

4166. Does it require a man to each engine?—The same man will do.

4167. Have you ever had charge of a steam launch?—Yes, in the "Crocodile."

4168. Have you sole charge of it?—Yes, sole charge of it.

4169. Do you work it under way?—Yes.

4170. What shall you do at the end of ten years, shall you re-enter?—I do not know, there is not much inducement to re-enter.

4171. You will wait till the time shall have arrived before you decide?—Yes.

4172. Are you satisfied with your position on board the "Crocodile"?—I should like a mess berth or some place separate to ourselves where we could get a mess and make ourselves comfortable.

4173. You mean a place enclosed?—Yes.

4174. Have you been on board the "Sultan"?—Yes.

4175. Have you seen the artificers' mess berth there?—Yes, but I forget what it was like.

4176. Have you ever assisted in the repairs of boilers?—Nothing more than caulking or plugging tubes up.

4177. Could you carry out repairs to boilers if wanted, put on a patch?—I could put on a screw patch.

4178. Could you put in a tube?—I could do that, I daresay.

4179. Did you belong to a trade's union?—No.

4180. Do they ever belong to trades unions before 18?—I cannot say, I never had anything to do with them.

4181. Do not the men at Glasgow belong to them?—Yes.

4182. Are you a married man?—No.

4183. Is there anything in your position on board the "Crocodile" that you would like to have altered besides your mess berth?—We should like to be altogether under the chief engineer and get our leave from him.

4184. From whom do you get it now?—We get it from the chief engineer, we are very well off in the "Crocodile," so far as that is concerned, but we are not so well off in all ships.

4185. In the "Malabar" had you a difficulty?—Yes, when I first went to her.

4186. What difficulty was that?—Perhaps when we could be spared, no leave was given on deck, and when leave was given on deck we could not be spared.

4187. Have you got the same master-at-arms in the "Crocodile" that they have always had?—Yes, since I have been in the ship.

4188. Have you any trouble with him?—When I went first to the ship he wanted to interfere.

4189. In what way; what did he do?—He told me that this was not uniform and I must not wear it. I said I did not mind whether it was or not, but I would not take it off for him.

4190. Do you like your uniform?—I should like some better sort of coat. There is no warmth in this jacket.

4191. Do not you generally wear a pea-jacket?—Not generally; in some ships we are not allowed to wear them, or at least we are not allowed to go out of the ship with them on.

4192. Would they not allow you to wear a pea-jacket over that one to go on shore in?—Oh, yes, in the ship I am in.

4193. Where do you wash in the "Crocodile"?—The only place is the stokers' place. We have got no regular wash place of our own. We have a couple of basins in from the engineer's storeroom.

4194. Do you wash in the stokers' place?—No.

4195. You wash in the other place just off the store-room?—Yes, there are a couple of hand-basins put up there.

4196. If you want to take a bath what do you do?—We have got to wait until the stokers' place is cleaned out, or the men have gone away.

4197. Why cannot you get it before them?—We cannot go off watch.

4198. Are you speaking now of harbour work or every day?—At sea we cannot leave the stokehold, or go off watch until relieved, and by that time the stokers' place is all filled up.

4199. (*Captain Dowell.*) You say that there is no inducement to re-enter after ten years; is not the prospect of a pension at the end of twenty years' service an inducement?—About £60 a-year I think would do.

4200. (*The Chairman.*) If it were £60 a-year it would be an inducement?—Yes.

4201. Have you an enclosed mess in the "Crocodile"?—No, an open mess.

4202. (*Captain Commerell.*) Were you satisfied with your pay on entering the service?—I should like to have something to look forward to in the way of increase of pay.

4203. On first entry were you satisfied with it?—It would do perhaps for a year or two, but I think it should be 5s. 9d. or 6s. a-day on first entry.

4204. Supposing you re-entered for a second 10 years, what would you consider a fair sum to offer you?—8s. 6d. or 9s. a-day. I do not mean right off at once, but it should be progressive, so as to ultimately arrive at 9s. a-day.

4205. I suppose you are aware that there are great difficulties in giving one class of men privileges that one is not enabled to give to another class which ranks with you. Now which would you rather have, increase of pay and be more under the exclusive control of the chief engineer, giving up your relative rank as a chief petty officer, or to remain as you are now?—I would rather give up the rank of chief petty officer, I do not value it.

4206. (*The Chairman.*) Are you aware whether your rank carries with it any privileges at all?—I do not understand much about it.

(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

FRIDAY, 29TH OCTOBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

EDWARD PAGE, Chief Gunner's Mate, called and examined.

4207. (*The Chairman.*) What position do you hold now?—I am a chief gunner's mate.

4208. In what ship?—The "*Monarch*."

4209. How long have you been in her?—Twelve months, since the tenth of June last year.

4210. How long have you served in the navy?—For twenty years.

4211. Have you nearly completed your time?—I have not completed my time, I have my boy's time to make up.

4212. Have you got your seaman gunner's time?—Not sufficient yet.

4213. How old are you?—35 years.

4214. What pension shall you get when you retire?—I think about £40 a-year.

4215. How long have you held petty officer's rating?—Since January, 1866, that is, first-class petty officer, I was a second-class petty officer years before.

4216. Have you been all your time in the "*Monarch*" as chief gunner's mate?—Yes.

4217. Where have you messed during that twelve months?—On the after part of the lower deck, in a place bulkheaded off.

4218. Where you are at present?—Yes.

4219. How many have you in the mess?—We have nine at present, seven chief petty officers, and two boys, in the first part of the commission we had twelve, all the chief petty officers messed there.

4220. Who is in the mess?—Four artificers, the schoolmaster, the chief boatswain's mate and the chief gunner's mate.

4221. Have you any other executive chief petty officers in the ship?—No, none.

4222. How is it that you had more in the mess at one time than you now have?—Because the master-at-arms, the ship's steward, and the writer messed with us.

4223. Where do the ship's steward and writer mess now?—They mess together in their cabin or berth which they have below, and the master-at-arms messes by himself in his own cabin.

4224. Have you had the four engine-room artificers in the mess for a year?—For the whole of the commission.

4225. Have you found any inconvenience from having them in the mess?—Yes. Very great inconvenience, indeed.

4226. What is it?—In the first place, as an executive chief petty officer, the commanding officer holds me responsible for the cleanliness and order of the mess, and of course it is a great deal for me to do, having duty on deck to attend to, to see to the cooking, cleaning, and so on in the mess. I thought it necessary once to propose in the mess that each member should take his turn, but the engine-room artificers objected to that and did not do it, because, they said, it interfered with their duties, and they were required in the stokehold; when the hands turn in in the morning they could not attend to the messing; we had two boys supplied from the training ship who knew nothing whatever about cooking the dinners, and little or nothing about cleaning the mess, and therefore it was part of the duty of the executive chief petty officers to put them in the way of it. It

has often happened on Saturdays, when the mess has to have a thorough cleaning, when I have been in the mess scrubbing and cleaning the mess traps, I have found out that they were working on deck. That is one inconvenience of the thing, and there are several others that I could mention; for instance, at sea, after drill is over, or even between drills, it happens that I have some writing to do; making out the drill list and correcting watch bills, and that sort of thing; and if I come down into the mess, I find the three engine-room artificers there in their undress clothing.

4227. Their working clothing?—Not their working clothes, those they have shifted; but they think they have a perfect right to lie down on the lockers, and if all three of them do that, they occupy the whole of the mess, so that there is no chance of anybody else getting into it, whatever they may have to do. The executive chief petty officers have lockers in the mess, and therefore it often happens they have to rouse the men out of their sleep to get at the lockers, if there is anything in them they want. Again the chief petty officers, the executive chief petty officers, who have been brought up from boys in the service, know what the mess requires, and what the commanding officer requires of them in the shape of mess fare, while the engine-room artificers, who have just left their homes and their workshops, bring all sorts of notions into the mess with them. I consider it my duty, and the commanding officer considers it so also, to correct any irregularities going on in the mess; but the engine-room artificers do not think I am justified in doing so, and feel in this way, that a cloth coat and a blue shirt do not agree, and think that they ought to be separated.

4228. Do you find the same difficulty with the seaman schoolmaster and writer?—In the case of the seaman schoolmaster, he is usually a young man who has just left school, not more than 20 years of age, and you can gradually work him into the ways of the chief petty officers. I do not think they have any objection to him messing with them.

4229. Do you find that engine-room artificers, after a few years' service at sea, improve in that matter, and get to learn the ways of the ship better?—Yes, they do; we have an instance in our ship, a man who has been five years an artificer, and nobody objects to his being in the mess, and he is willing to assist. We had two boys once, but one was sick once at the hospital and the other was sick on board ship, and it was arranged that each man should take a turn to clean up the mess and cook. One engine-room artificer said he did not think it was right his doing so, he said it was not one of the articles he signed for; accordingly it was mentioned to the head of his department, to the engineer in charge, and he said, "No; of course not, he is not to do anything of the kind"; and in consequence of that I had to go before the commander, but since then we have had boys in the mess.

4230. Do not you think that boys coming from a training ship might be very soon taught to do all the cleaning and cooking arrangements that the mess required?—They could in some cases if you kept the boys long enough; after a boy has been on board some nine or ten months he could be rated as an ordinary seaman, and would be just as useful to

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his messmates too; he is turned on to the deck to do his work there.

4231. How long is the boy excused from duty to attend to the mess?—Till 9 o'clock.

4232. During the rest of the day there is none at all?—None at all; they mess with us in our mess, so that they are always there at meal times.

4233. To bring in the dinner, and that sort of thing?—Yes, and to bring their own.

4234. Have the engine-room artificers ever complained of the style of the mess, the kind of food which they have?—Yes, they object to the food, and we find it very disagreeable in a pecuniary sense; that is to say, they do not think the food is good enough for them; they seem to think they have been brought up to better food, although the executive chief petty officers think it very good; they think they ought to have something extra in the mess; we have three on board ship now, three young single men, and, of course, their wages will allow them to have something extra in the mess; but I could not afford to pay 15s. a-month out of my pay, nor could the chief boatswain's mate, and that difference of pay causes a difference of opinion in the mess.

4235. Do you scrub your own hammock?—Yes.

4236. You do, yourself?—Yes, I do it myself.

4237. What do the engine-room artificers do?—They generally pay another man to do it for them.

4238. Out of the four engine-room artificers in your ship, three are single men, are they?—Yes.

4239. What would you suggest with regard to the mess of engine-room artificers?—I cannot point out any particular hardship, but I think they ought to be separated from the lower deck, and from the petty officers altogether. They are respected, I believe, by the ship's company, and respected as a superior class of men, but the ship's company would like to get quits of them altogether. They seem to think they ought to be messed in another part of the ship, and have the attendance of a servant. In the leading stoker's mess there is a stoker excused to look after the mess.

4240. Where is his mess?—On the deck below our mess deck.

4241. Would there be any place there where the engine-room artificers could mess?—There are two small messes, one of them where they used to mess in the last commission.

4242. You think it is recognized by the seamen in general that their having learnt a trade before they came into the service, puts them in a superior posi-

tion to the generality of seamen on board ship?—Yes.

4243. Having learnt a trade makes them independent on shore?—Yes; and they feel it themselves. As a rule they are very well educated men, and I have no fault to find with them personally.

4244. What age men are they?—From 25 to 30 is about the average of their age. I do not think there is such a thing as jealousy exists, or that one man is jealous of the position of another, or of his uniform, but the chief petty officers do not think that the men should be introduced into the mess as chief petty officers at once. I may say that a lad of 19 or 20 years of age leaves school after passing through an examination, and is introduced into the chief petty officers' mess as schoolmaster, and is respected as a schoolmaster, but that man has the same position in the messroom as a man of 40 years of age, who has passed 30 of those years in the service, which does not seem quite right.

4245. (*Captain Commerell.*) The same feeling exists in relation to all the chief petty officers who come in straight from the shore?—Yes.

4246. (*The Chairman.*) Are not the schoolmasters who come from Greenwich school the sons of seamen?—In our case it is not so. I do not know that I have ever been shipmates with one who was the son of a seaman.

4247. (*Captain Commerell.*) Have you observed, or is it your opinion, that the police are more strict with the artificers than with the other chief petty officers of equal rank?—No, I do not think they are. I think they are more inclined to lean towards them; they seem to make better friendships, and there is a better feeling existing between them than in the case of any others.

4248. We have it in evidence that the principal complaint of the engine-room artificers is, that they are worried about, and the master-at-arms is generally down upon them?—I cannot answer for other cases than my own case in the "Monarch;" but I may say that the master-at-arms there has always dealt with them as one man should deal towards another; and I do not think he is at all unjust or unfair towards them; he talks with us, and converses with us when we go ashore together, and we enjoy ourselves on shore, and behave like one man should to another.

4249. (*The Chairman.*) Do you like the situation of your present mess?—It is well lighted and well ventilated, and, in my way of thinking, as a seaman, is a very good mess indeed.

(*The witness withdrew.*)

GEORGE COOK, Esq., R.N., called and examined.

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4250. (*Captain Dowell.*) Where are you now serving?—On board the "Royal Alfred."

4251. How long have you been in her?—I have belonged to her for about twelve months altogether.

4252. What was your last sea going ship?—My last sea going ship was the "Inconstant," with Captain Waddilove.

4253. How many years have you been in the service?—Nearly 30 years.

4254. How long was it from the time of your entry until you were made a chief engineer?—Eleven years.

4255. What is your standing as a chief engineer?—Since 1857.

4256. What is your age?—Fifty-five next birthday.

4257. When you retire at the age of 55, how much time will you count?—About 30 years.

4258. Does that include the whole of your junior time?—Yes, but out of that time I only count 24 years for retirement, thereby losing nearly six years, as I

joined the service in 1846, and was promoted to second engineer in 1852; consequently the time I served as third does not count. During the time I was third assistant I served in the West Indies and on the West Coast of Africa for nearly five years. I passed my examination for second engineer on my return from the West Indies, and was then appointed to the West Coast of Africa, where I served for two years, and on my return home was again sent to sea without promotion; but that was no fault of mine, as I have certificates which are very flattering.

4259. What will be the amount of your retirement?—About £305 a-year.

4260. (*Captain Commerell.*) After how many year's service?—Thirty years. I was 10 days over 25 when I joined. I have 24 years counting out of my 30 year's service. I think we are the only class of officers in the service whose time does not all count.

4261. (*Captain Dowell.*) How is it that, counting 24 years' service, you only get £305. According to this scale you should get £370 on retirement at 55 years of age?—I was 10 days over 25 when I joined,

and that makes about £65 difference; but if my time counted I should get the maximum.

4262. How long were you an engineer before you were made a chief engineer?—I was promoted in about five years; specially so, over a great number, for the Baltic.

4263. At the time you were promoted, what was the general seniority of the engineers?—At the time I was promoted, about 13 years.

4264. You were five years an engineer?—I was only three years and two months an engineer or first assistant; the first assistant and engineer are the same.

4265. Had you any engine-room artificers in the "Inconstant"?—Yes.

4266. What sort of men were they?—Pretty fair.

4267. Of what trades were they?—Boilermakers.

4268. How many had you?—Two.

4269. Were they both boilermakers?—Yes.

4270. Were they competent to take charge of a watch in the engine-room?—Not when I left; they had never been in the engine-room, I always sent them into the stokehold. I should have been very sorry to place an engine-room artificer in charge of the watch in the engine-room in one of those large ships in the channel squadron.

4271. Have you ever been with engine-room artificers whom you would have considered competent to take charge of a watch?—In a small ship, but not in one of the large ships.

4272. You are in the reserve, I think?—Yes.

4272*. Have you had any experience of fitter engine-room artificers?—Yes, there was one in my last ship.

4273. What ship was that?—The "Royal Alfred" at Portland, the coastguard ship, and I had two in the "Duncan."

4274. What sort of men were they?—Very fair men, but not first-class men; but I have come across good men in the service, although not in my own ship. I should certainly say that the majority of the artificers we have got in the service are not what I consider they ought to be.

4275. Do you consider that the pay which is given to engine-room artificers is sufficient to induce good men to enter the service?—I do not.

4276. Do you know what it is?—Yes. I think the usual trade price for mechanics in London is about 6s. a-day, and some get more, and then they have homes to which they can go from Saturday to Monday morning. Now if they come into the service they come in at a lower rate of pay than they get ashore, and they have to put up with a very great many unpleasant things on board ship, which they strongly object to. If you want to get the men that we ought to have in the service, you will have to raise the pay beyond that which they get on shore.

4277. You know what their pay in the service is?—Yes, 5s. a-day on entry, and 5s. 9d. a-day after three years.

4278. You say that a fitter in a private firm will get 6s. a day?—Yes.

4279. That is 36s. a-week?—Yes.

4280. An engine-room artificer in the service receiving 5s. 9d. a-day gets 40s. 3d. a-week?—Yes; but if a mechanic on shore works overtime, the first two hours counts a quarter of a-day; after 8 o'clock, time and a-half; after 12 o'clock, double time till 6 in the morning.

4281. You do not think that the extra day's pay is sufficient compensation for having to work on board ship at any hour?—No, I do not.

4282. Can you give the Committee any idea as to what their pay should be?—I think you ought to raise their pay at the commencement to the pay that a mechanic would get on shore, that is, 6s. a-day; that pay ought to increase progressively after one year's service when confirmed 6s. 6d. a-day, after five years 7s. a-day, after ten years 7s. 6d., after fifteen years 8s., and after 20 years 8s. 6d. a-day.

4283. Do you consider that if that pay were offered,

there would be a sufficient inducement for men to enter and to remain in the service?—I do think so, if there were certain alterations made with regard to their comfort on board ship, but not under the present circumstances. I know for certain, that there is a feeling among the best mechanics (the men that we ought to get in from the large engineering firms), that a man is disgracing himself by coming into the service, in consequence of his having to do menial duties to which he naturally objects.

4284. What improvements would you suggest?—I think they ought to be taken away from the stokers altogether, and to have some place where they could wash: they look upon those things as of very great importance. Among all the grievances that I have heard from them, I have heard more about want of comfort than their pay, a great deal more. If it were practicable they ought to mess by themselves, and be taken away from the petty officers. They used to come to me and say, "We are on the lower deck, and have to eat this, and put up with this food and with that discomfort; we have got the pay, and could afford many little things towards our comfort, but cannot have them on the lower deck." Again, the master-at-arms and the ship's corporals ought not to have so much power over them as they have at present; and there are a great many little annoyances that they have to put up with which might be avoided, and yet which do not interfere with the efficiency of the service in any way.

4284*. Take the question of leave: is it not customary for the engine-room artificers to go simply to the chief engineer, and, if they obtain his permission to go out of the ship, merely telling the master-at-arms that they are going?—In the "Inconstant," during the first part of the commission, they were compelled to go through the ordinary routine; but when Captain Waddilove came to the ship it was altered, and it worked admirably. When the "Inconstant" came into harbour, after cruising at sea for some time, we had a great deal of work to do, and the engine-room artificers were required on board. I could not spare them when leave was given to the ship's company, but when their work was finished they could go on shore. Then there was a difficulty raised: the master-at-arms could not take them before the commander on that day, or, if they did go before him, the commander would perhaps say, "These men ought to come up at the proper time; I cannot make any difference between them and the other men"; and I have known instances where the engine-room artificers have not got on shore at all. I think that that ought not to be so, as they have been hard at work, and cannot always go at the same time as the others. When Captain Waddilove joined the ship, we never had any difficulty of that sort, which shows what can be done.

4285. In the "Inconstant" I understand there was a general mess, and all the chief petty officers messed together, from the master-at-arms downwards—how did that answer?—It did not answer, I know, because they used to make complaints to me; they came several times complaining of their food, and of having been found fault with about the mess not being cleaned, and I have had them sent for out of the engine-room about drills and other things. Here we have a man whose labour is worth 6s. or 7s. a day, and he is taken away from his legitimate duties to do that which a man could do at half, or fourth, or even a fifth of the price, and naturally he is discontented.

4286. In this ship, where the Admiralty instructions were carried out most rigidly, the thing did not answer, and the men were dissatisfied?—It did not answer.

4287. Are you aware of how they managed about their hammocks?—They paid a man for doing them, but then they were responsible still, and if anything was wrong they were sent for about it—they paid for having them scrubbed out of their own pockets.

4288. With regard to their washing arrangements, was there any difference between them and the stokers?—No.

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4289. In your opinion there ought to be?—Most certainly.

4290. Have you ever heard any complaints about the uniform which they wear?—No, never.

4291. Have you heard any complaints about their chests?—Yes, I have; there were orders for their chests to be cut down, and they made complaints and said that they did not know what to do with their clothes, and if they put them in the stokers' lockers they got spoiled.

4292. Why were they cut down?—Because the chests were larger than the master-at-arms or some of the chief petty officers thought right, they were objected to; it was not particularly because they took up more room.

4293. Were not they simply cut down to the admiralty regulation size?—They were, but I do not know what the admiralty regulation is with regard to the size of their chests.

4294. Do you think that the pension which they have a prospect of receiving will be any inducement for them to remain in the service?—I think it is an inducement, but not a sufficient one for them to join. I do not think that many of them take the pension into consideration until they have been in the service for some time. I do not think that they take the view of it when they come into the service that you suppose they do.

4295. Are you of opinion that the pension is sufficient for their services, considering that they have to serve twenty years before they get it?—No, I do not think it is.

4296. How much do you think it ought to be?—I should think it ought to commence at £50.

4297. Independently of character you would give a man £50?—Yes.

4298. What would be the maximum?—£80.

4299. Do you think it would be any inducement for them, or that it would be at all advisable that they should at any period of their service be raised to the rank of warrant officers?—I think not, I am afraid if you made warrant officers of them you would spoil them, I think it would be better to take away the grievances which they have, and give them better pay and a fair pension, that would be more beneficial to the service than making them warrant officers, we want them to work on board ship, the same as mechanics work on shore. I would submit that their uniform if possible, should be altered, because you know that uniform has a great deal to do with the respect paid to men; having a number of men under their control I think some slight alteration would be beneficial.

4300. What would you suggest?—I would give them a frock coat.

4301. Do not you think that if you give them a frock coat you will be running into the very difficulty you avoid by not making them warrant officers?—What does the master-at-arms wear?

4302. He does not do the manual labour that your men do, you must remember?—I think if you question an engine-room artificer you will find that he has a far higher opinion of himself than he has of the master-at-arms; I think that the mode of dealing with the engine-room artificers on board ship is a most important one, and one which requires some consideration, because it will not do to let them suppose that they are not working men and artificers; once they have that idea that they are not working men but officers, they will not be worth anything.

4303. With regard to the mustering and inspection of these men on board ship, how have you seen those things arranged?—In different ships they have different arrangements.

4304. Have you any recommendations to offer to the Committee on that point?—I think if they came more under the supervision of the chief engineer it would save a great deal of unpleasantness, and it would work better.

4305. Is it not the custom for the stokers and everybody in the department to be so at present?—The stokers at present do come under the engineer,

but the engine-room artificers not so much. I have never had an artificer yet who has not said "I wish we were more under your orders, and then we should not have this one and that one interfering with us," they were constantly telling me that.

4306. Do you think that the promotion of the engineers in the service is at present satisfactory?—No, I do not.

4307. What would you suggest to improve it, or have you any recommendations to make?—I think that a greater number of chief engineers could be employed; there are many ships whose power has increased very much since the last order came out; I think that chief engineers might be employed in ships over a certain horse-power; the old circular stated that chief engineers were to be employed in ships of 200 horse-power nominal; at that time 200 horses nominal used to mean three times indicated, if we got three times we thought we were doing very well, but now it is about eight times, the consequence is that nominal horse-power is a thing of the past altogether, and an exploded idea. I think that chief engineers should be employed in ships of from 700 to 800 indicated horse-power.

4308. Do you think that under any circumstances we should be able to reduce the number of engineers in the junior branches?—I think by introducing a proper class of artificers we should be able to, and it would be with great advantage to the service.

4309. In the "Inconstant" how many engineers had you?—Nine, besides myself.

4310. If you improved the class of engine-room artificers, and made them competent to take charge of engines, so far as driving is concerned, what reduced number of engineers could you do with?—I would never think of having an artificer in charge of the watch, especially in a ship in the Channel Squadron; I am opposed to that altogether.

4311. What number of engineers would you suggest for the "Inconstant"?—A chief engineer, a senior, and three watch-keepers, and in case of one of the watch-keepers going sick I would let the senior engineer take watch for the time being. I think five engineers and from five to six engine-room artificers, after those men had got accustomed to the ship, and had been in the service for some time, would be sufficient.

4312. At what age do you think an officer should be promoted to the rank of chief engineer?—I think, considering the duties he will have to perform in a ship of the present day, he ought not to be over 40 years of age; if he be promoted at the age of 40, by the time he is appointed to an Ironclad he may be 46 or 47, and at that age a man is quite old enough.

4313. What do you think is the youngest age at which a man should be made chief engineer?—From 30 to 32 years of age.

4314. How would you propose to reduce the list of engineers?—I would employ chief engineers in smaller ships, or retire a certain number of engineers till the list was brought down to (say) 500.

4315. Do you think that the present scale of retirement would be sufficient to induce engineer officers to go?—No, I do not.

4316. What would you suggest?—I think, judging from what I have heard from almost all the engineers I have spoken to, for some considerable time past, that they would be perfectly satisfied if they could get 6*d.* a-day for every year's service; that is the general opinion amongst all, and it would give general satisfaction to all classes.

4317. If engineers were allowed to retire upon a pension of 6*d.* a-day for every year's service, which do you think would go, the older or the younger engineers?—I am afraid, if you left it to their option, that you would find most of the young ones would go, as there are so many openings for them.

4318. They would not go unless it was good retirement?—If a man could go on £70 or £80 a year he would have a good start, and there are lots of openings for him.

4319. Why do they come into the service if there are so many openings for them outside?—They came

into the service under the impression that they would be promoted to chief engineers in a reasonable time, and rise in their profession, but the experience they have gained in the service is of great advantage to them in procuring other employment.

4320. Are you satisfied with the training which the engineers receive as engineer students in the dockyard?—I am not.

4321. In what way are you not satisfied?—I think that a great number of students who come into the service are not efficient as far as their practical abilities are concerned. I have found that from my own experience.

4322. You are not satisfied with their practical training?—No, I am not; I saw some work in the steam reserve workshop the other day which had been done by them, and I must admit that a great improvement has taken place in the work of the students; the work that they were doing there was very far superior to that which was done some four or five years ago.

4323. You are aware that the system of training and examination has been altered since 1873?—Yes.

4324. Have you ever seen that circular?—No, I have not.

4325. But you think that their practical work has improved since 1873?—I think so, decidedly.

4326. It is more satisfactory than it was?—Yes; I think, if the system be properly carried out, the students will have a better opportunity of making good practical engineers than would be afforded in a private firm; in a private firm the master could not afford to keep shifting his apprentices from one job to another. I think, if I may dare say such a thing, that they have hardly been looked after sufficiently. I have myself seen on board ship two or three students come with a party of men, and they have never done a single thing themselves as far as practical work was concerned.

4327. Has that been of late?—No; not of late years.

4328. Are you aware how the engineer students are entered?—Yes; by competitive examination.

4329. Do you think that the social class from which they are drawn is satisfactory?—No; I do not.

4330. Have you any suggestions to make that you think would improve it?—I think that the Admiralty should nominate them, and I would (if I am not out of place in making the remark) place them on a different footing with regard to pay on entering, I would not give them anything for the first two or three years; this is not an unusual thing, indeed, it is a very common thing in private firms. I take myself as an example. I did not receive a penny piece for the first eighteen months; it is quite common in all large engineering firms, or at any rate it was in the olden times, I do not know whether it is at the present day. We never got a penny at first, and afterwards merely got a nominal sum.

4331. Supposing a man is taken to Portsmouth to live by himself, the expense would be considerable?—If you can get a class of students of a better social position in any other way, then I say, certainly give them something; my principal reason for mentioning that was that I thought it would raise the social position.

4332. The Admiralty will decide upon the social position?—Yes.

4333. Do you think it would be advisable that there should be a mess in the dockyard for them?—I do not know. I was thinking whether it would be advisable to put them under discipline at the first commencement, but that is a question upon which I could not venture to give an opinion, and it requires a good deal of consideration.

4334. Practically, have you found that the young engineers, when they come into the service, are as good workmen as the engine-room artificers?—Much better; there are exceptions, but as a rule I have always, if there were anything particular to do on board ship, given it to an engineer and never thought of giving it to an engine-room artificer; but then, if

you get a better class than at present, good fitters and those kind of men, I do not see any reason why those men, as far as practical work is concerned, should not be able to do anything that was required.

4335. Still it would be necessary for an engineer to do work at times, you think?—Yes.

4336. (*Mr. Wright.*) Is not that opinion rather against the opinion that you gave that the engineer students are not properly trained?—I said there were exceptions, as I have always found amongst the staff efficient practical engineers. Do not you think it would be advisable to throw a certain number of nominations or entries for the service into the large engineering firms, say a fourth of them? I think it would have the advantage of bringing fresh experience and new ideas into the service; there are lots of gentlemanly fellows at the present day who are articled pupils, and they, I think, would join the service. I believe it would be worth consideration whether a certain few of them should not be allowed to compete with the students.

4337. (*Captain Commerell.*) How would it answer if the Admiralty took the nominations for the engineer students into their own hands, and gave every year so many nominations to each of the private firms?—I would not do that. I would sooner, if I gave any away, give to some of the public schools; a couple of nominations to New Cross school, or some of those sort of schools. I would not give to firms; I would not allow them to have anything to do with it as you would be giving the engineering firms a certain amount of patronage.

4338. I mean that the private firms should have the power of selecting young men to compete?—Quite so; that I should agree with.

4339. (*Captain Dowell.*) With regard to the engineers' mess, do you think that is satisfactory?—That is rather a difficult question to answer.

4340. Should you recommend that the engineers should be taken at once into the gun-room or ward-room messes?—I am not an advocate for taking them at once into the gun-room.

4341. Not if we improve the social position of them?—Yes; if we improve their social position, but not as at present. I think that an engineer ought to go into the ward-room after he has been five or six years in the service. I cannot see any objection to that, but at present I do see a strong objection to the junior engineers going into the gun-room. By-and-bye if we get men from a better social class and the number is reduced, it would then be advisable. I think that the engineers in smaller ships would do better at the general mess; there are about twenty ships where they have a general mess, and every thing goes very satisfactorily, as far as I know there has not been a single hitch, and it works very well; in fact it would be necessary, because in small ships, where you have two engineers, in a double screw gunboat for instance, there is one in the ward-room and one in the engineers' mess, and you could not keep a mess going for one engineer; what will you do with him? You cannot shut him up by himself.

4342. (*Mr. Wright.*) Are there any difficulties on the score of expense in these gunboats in two engineers messing in the wardroom?—We are under the impression that the Admiralty might increase the pay, and that would meet the difficulty.

4343. (*Captain Dowell.*) You recommend that all ships working up to 700 indicated horse-power should have chief engineers?—Yes.

4344. Do you think those chief engineers in small ships would object to keeping a watch?—They cannot object; if I were serving in that class of ship (or any other) and it were necessary, I should, of course, keep my watch.

4345. You do not think there could be difficulty in that respect?—There could not be. I think it is a thoroughly understood thing. I never heard anything to the contrary; it is something new to me that a chief engineer should not keep watch if necessary. I do not think I ever heard the question raised before.

4346. With reference to the present pay of engineers,

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have you any suggestion to make, or do you think it is satisfactory; they commence at 6s. a-day, and they rise at the end of a certain time to 10s. a day?—I think that engineers' pay, not being increased for perhaps 10 or 15 years, they are naturally dissatisfied, not only with regard to the pay, but with the promotion, or rather want of it.

4346a. Do you think that a man on first entering the service as assistant engineer, and receiving 6s. a-day, is adequately paid?—I do.

4347. And you would propose after that, what?—I would, after confirmation, give him 8s. a-day, and his pay should increase progressively up to, say 14s. or 15s. a-day. An engineer of the present day goes as senior of a ship, and you know what that is; he has a great deal of work to do; and he says, as soon as this commission is over, "What have I to look forward to? Neither increase of pay nor promotion, but simply to serve on in the same capacity," which is a very discouraging reflection. I was thinking that if you put two chief engineers in some of our large ships, in order to give promotion, it would do.

4348. Has it ever answered?—I have been told it has not; only two cases have been tried, and they did not answer; two paymasters get on very well, and two doctors, so I do not see why two chief engineers should be an exception.

4349. Do you think that the pay of a chief engineer is satisfactory?—I do not think it is, certainly not, in fact, if you increase the pay of engineers, you must increase the pay of chief engineers.

4350. What would you suggest?—He ought not to get less than 15s. a-day at the first commencement, and rise up to, say 24s. a-day.

4351. At present he rises to 22s. a-day?—Yes, he rises to 22s., and he cannot get more.

4352. You would make his pay up to that of an inspector of machinery?—About that.

4353. (*Captain Commerell.*) One shilling short?—Yes.

4354. (*Captain Dowell.*) What, in your opinion, should an inspector of machinery get?—I think that their pay ought to be increased. I think that the inspector of machinery of the fleet ought to get, at least, as much money as the paymaster, and the paymaster gets £1 18s. a-day. The inspector of machinery is quite as important as the paymaster, if not more so.

4355. Do you know anything about the pay of the engineers in the merchant service?—I think that the pay of some of them in the merchant service is about £20 or £25 a-month. I speak of the Peninsular and Oriental and the principal West India mail companies.

4356. Do you think that they are socially as high a class as our own engineers?—Yes, I do.

4357. Taking the specimens we have had of late, do you think that it is higher?—I cannot say.

4358. (*Captain Commerell.*) Do you think that if the pay of the inspectors of machinery, chief engineers, and engineers, taking into consideration the relative ages at which they are promoted, was assimilated to that of other branches of the services, it would be received with satisfaction?—I do.

4359. They ask for nothing more, and they want nothing less?—They want nothing less and nothing more than I know of. I believe that would give general satisfaction.

4360. (*Captain Dowell.*) Have you read this pamphlet, "The case of the naval engineers"?—I read it a few days ago; and I had heard of it before.

4361. Do you quite agree with beginning at 9s.?—I do not. I was not at home at the time it was drawn up, and had no more idea of who drew up that pamphlet than you have.

4362. (*Captain Commerell.*) You are aware that the great difficulty in dealing with the engine-room artificers is, first, that they, through entering late into the service, have not been accustomed to naval discipline, and secondly, that, ranking with chief petty officers and having so much more pay than those

men receive, there is a certain amount of jealousy between them?—I am fully aware of that.

4363. Do you think that these men, who must of necessity be highly paid, in order to obtain first class artificers, should be attached more exclusively to the engine-room, and cease to have any relative rank?—I think you will be compelled to give them some rank, because, otherwise, you would have the stokers and leading stokers objecting to taking orders from them if they were not superior officers, you must give them a certain amount of rank, in order to enable them to take command of the stokehold.

4364. Which would the artificers prefer, do you think, relative rank or good pay as first-class engine-room artificers?—I think an engine-room artificer would prefer good pay; but I can hardly answer that question, not having sufficient experience of them; that would be better known amongst themselves, I should think.

4365. In your experience of engine-room artificers you have had to deal more with boilermakers than fitters, have you not?—Yes.

4366. What proportion of fitters to boilermakers do you think there should be?—I put down the percentage of artificers for the navy at, fitters 60 per cent., boilermakers 25 per cent., when I say boilermakers I mean boilermakers, and not riveters, and 15 per cent. of moulders, pattern-makers, and engine-smiths and coppersmiths.

4367. Do you consider that a fitter is a man worthy of more pay than a smith artificer?—Yes, you will get plenty of ordinary smiths in the service amongst our stoker mechanics. We are never at loss for a blacksmith on board, we ought to have a few superior workman in the fleet, so that if anything happen to the machinery, or there is a smash, we should have these men to fall back on for a higher class of work; but the smiths entered ought to be what we term enginesmiths.

4368. (*Captain Dowell.*) The artificers should be confined to fitters, boilermakers, and enginesmiths?—And moulders; they are useful for the flagship.

4369. (*Mr. Covey.*) Would you have a copper-smith?—It does not follow that we want one in every ship, but there might be one in the flagship; there ought to be one or two good moulders and pattern-makers, in case of anything happening; if you have such a regular staff, with the labour and material at your command, you could do anything.

4370. (*Captain Commerell.*) What do you believe is the principal reason that would make a first-class artificer leave his profession and family on shore and come to sea; what is his principal inducement?—Well, I believe the majority are single men; but in the case of married men, I should suppose the pension would be an inducement; that might be their consideration, still not to the extent you perhaps imagine. I think it possible that the change in the mode of life may be an inducement for the single men.

4371. The desire to see foreign countries?—Yes. You will understand that is an inducement to go to sea.

4372. If you reduce the list of engineers, how would you propose to draw an increased supply in case of war?—It would never do, if you are going to reduce the number of engineers, to let them go away without some guarantee or clause that they could be called upon if required. Supposing you had 500 engineers, you would find, in case of war, that your 500 engineers would be soon swallowed up. I do not know what arrangement could be made; but the engineers that are retired should be retired so that you could put your hand upon them again if required. During the Russian war we took in a number of engineers. I had one in a gunboat with me that was getting £16 a-month, while I was getting £12 a-month; he received that from the day he joined the ship till he left, and never kept a watch; he behaved so badly that the captain sent him forward, and he messed with the stokers. Just to give you

an idea what the man was, I may tell you that the first job he had to do was to put a piece of packing into one of the Kingston's; it has a cross handle. I told him what to do; but he took the pin out and shoved the valve through the bottom of the ship. I could do nothing with him; he was not worth his salt.

4373. You must remember that after a few years the whole of the retired list of engineers would be melted away, many would be dead and many gone abroad, and many arrived at an age when they could not be sent for service afloat?—I do not know whether you could hold out a greater inducement to the mercantile engineers; they appear to have a strong objection to putting their names down in the reserve, you can get executive officers but the engineers hang back; it is evident there is not a sufficient inducement at present for the engineers in the Peninsular and Oriental and West India Companies, to join the reserve. I think if they came into our service you would find this difficulty, that were you to put them in our ironclads they would be lost, as they would have to thoroughly understand the discipline and routine of a ship, and to know the watertight compartments, and anything wrong with the guns, and so on, no matter what it is. There are lots of things we are called upon to do, and we know what to do and where to go, whereas a man coming in from the merchant service, would be lost; but you may put them in another class of ship.

4374. Are you aware of the way in which the engineers are brought up in the American navy?—I have some idea.

4375. Do you approve of that plan?—I think it is not a bad plan, I think the engineers of the American navy, from what I have seen, are well up to their work, and are an efficient body of men.

4376. Do you think that their system is capable of much extension in case of war?—No, I do not, that is the difficulty out of which I cannot see my way in our own navy, that is, with regard to the supply of engineers for the service in case of emergency, if we could get a certain number of engineers to join the reserve, so as to know that you have a lot to put your hands upon in case of emergency, it would be very well.

4377. (*Mr Wright.*) From your experience, you would rather have a reserve of men who have been accustomed to men-of-war, than men from the mercantile marine, or from the trade throughout the country?—Yes, most certainly.

4378. (*Captain Commerell.*) Do you think you could ever train up the best engine-room artificers to be as thoroughly efficient as engineers in case of war?—I think you might a certain number; I think for watch keeping purposes you might; there is no reason why it should not be so, if they were properly trained in the smaller class of ships. As I have already said, I should have a very strong objection to placing an engine-room artificer in charge of a watch in a ship in the channel squadron. I would give the engineer charge of the watch, and he should have an engine-room artificer with him. As a rule he can never leave the platform; and an engine-room artificer, I have often thought, would be of good service to him, because if anything is wrong in the engine-room, any little thing that might require his attention, he cannot leave the platform to go and see to it himself; he must either call the engineer out of the stokehold or he calls one of the engineers from the mess, or, as I have often seen done, he calls the chief engineer. There is another thing that I have often had difficulty with regard to in the channel squadron, and that is that the chief engineer of the ship has such a lot of duties to perform that to keep his books thoroughly without a little assistance is impossible. When at steam tactics the chief engineer is always in the engine-room; he has all kinds of duties to perform, and he finds that to do them properly, and to keep his log-book and everything going is impossible for one man to do, and he takes generally an engineer to assist

him, thereby losing his services in the engine-room. If you reduce the complement of engineers, one could not be then spared for such a duty; and I think it would be of advantage to the service if some one were appointed specially to assist him, a writer or whatever you like to call him. I found that it was perfectly impossible to keep my books and to do my work as I ought to do it on board.

4379. Have you had great experience in double-bottom ships?—I have had experience.

4380. (*Captain Dowell.*) You had no double-bottom in the "Inconstant," had you?—Yes, we had.

4381. (*Captain Commerell.*) Do you think that you could train an engine-room artificer to take charge of the double-bottom under the senior engineer?—Yes.

4382. You think that for that sort of work an engine-room artificer might be made thoroughly efficient?—Yes.

4383. How would you propose that the leave arrangements of the engine-room artificers should be carried out when they wish to go on shore?—I should propose that they should get permission from the chief engineer of the ship, and after that they should ask the commander or lieutenant for leave, or the senior engineer should go and ask for them direct.

4384. I suppose you are aware that that is very different to the present system, not only for the artificers but also for the other chief petty officers of equal relative rank?—I have seen the ship's steward and writer and master-at-arms (in fact the master-at-arms never goes out of the ship without the permission of the commander) go direct to the commander for their leave.

4385. Do you think there would be no practical difficulty in that?—Not at all.

4386. (*Mr. Wright.*) Do you know the reason why a number of senior chief engineers do not wish to be promoted to the rank of inspector?—Yes, for instance, if I had been promoted to the rank of inspector some few months ago, I should have had to serve three, four, or five years longer, and my pay would not be more than at present, and I should have to be on half-pay 12 or 18 months; the consequence of all that is, that it would not have paid me to become an inspector, and I should have lost by it considerably.

4387. (*Captain Commerell.*) Did you refuse to be made an inspector?—I expressed a wish not to be. I am getting the same pay as a chief engineer, with the option of going in a short time, and if I had been made an inspector that would not have been the case, I should have been on half-pay for some time, and then when I did get employment I should have had no more pay than I have now.

4388. Have you any sons?—Yes, one.

4389. As matters are now with the engineers, the education and all combined, would you feel inclined to put your son into the same profession as yourself?—I have put my son out already. I have sent him to one of the London hospitals. I should have made him an engineer if I could have seen my way clear.

4390. (*Mr. Covey.*) You said that you did not think the engine-room artificers thought much about their pension, do you think that the fact of their getting two or three weeks' leave, and being paid for Sunday, is an inducement for them to join the service?—Perhaps it is. I think as a rule that an artificer, on joining the service, does not properly appreciate his pension. I mean that he does not take it into consideration as much as he ought to do, it is not the inducement which you would expect it to be, it is only after he has been in the service for some little time, that he thoroughly understands the benefits which he is going to derive.

4391. Do you think it is a sufficient inducement to make him re-enter after he has served ten years?—Certainly not, as it is at present. I think you will find

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G. Cook, Esq., that a very large majority will not rejoin; the men
R.N. you will get to rejoin will be of very little use to the
service; the best men will go.

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4392. Do you approve of making engine-room artificers from the leading stoker mechanics?—No, I think not, I would prefer taking them from the outside trade. I have seldom come across men as stoker

mechanics whom I considered fit. I have never come across a man that I considered was thoroughly efficient in that respect; if you are going to increase the pay of the engine-room artificers, you ought to get what I call good workmen for the money; I suggest. To get a better class of men you must pay the price for them, no doubt about that.

(The witness withdrew).

Mr. JAMES MERCEUR, R.N., called and examined.

Mr. J. Mercer,
R.N.

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4393. (Captain Dowell.) What is your standing?—The 21st July, 1869.

4394. In what ship are you now serving?—In the "Volcano," Portsmouth steam reserve.

4395. When did you enter the service?—On the 12th January, 1863.

4396. Have your prospects altered at all since you first entered the service?—Yes; very much.

4397. How long did you expect to be in the service before you were made a chief engineer?—I thought from 11 to 12 years at the outside.

4398. What prospect have you now of being made a chief engineer?—I have no hope at all, at the present rate of promotion; I could not possibly be made one, my age would not allow of it.

4399. How old are you?—42 next March.

4400. How old were you when you entered the service?—About twenty-seven and nine months.

4401. That is above the ordinary age, is it not?—28 was the limit, and I entered as that, but my proper age was twenty-seven years and nine months.

4402. Where were you before you entered the service?—At Woolwich arsenal.

4403. And you entered with the prospect of being made a chief engineer in eleven or twelve years?—Yes. I was told that was about the fair average.

4404. Will you state to the Committee what you consider to be the fair grievances under which the engineers in the service now labour?—Their grievance is the slowness of promotion, and they require progressive pay and better retirement.

4405. How would you suggest that the promotion should be accelerated?—To commence with the assistants, and give them an increase of pay every three years, until they arrive at 12s. a-day; they should be promoted as soon after that as possible, when, as chief engineer, they should receive 14s. per day, and they should be not more than 35 years of age when promoted.

4406. To the rank of chief engineer?—Yes; not later than 35 years of age.

4407. What pay would you commence at?—7s. 6d. a-day; that is 1s. 6d. a-day more they have at present.

4408. What grounds have you for asking for an increase on first entering the service?—In order to get the proper people, and the people that we require in the service.

4409. How would that induce people to come in. Do you think that the simple fact of there being 1s. 6d. a-day more offered after they had passed from engineer students to assistant engineers would be a sufficient inducement for a higher class to enter?—Yes; with the quicker promotion, doing away in time with the engineers' mess, progressive pay, and all time counting towards retirement.

4410. Do you think that all things remaining the same, if engineer students are entered as they are at present, an extra 1s. 6d. a-day would induce a higher social class to enter?—I think it would.

4411. What should prevent men from coming in now?—They have not the chance; it is not known outside; the class that we get now is not the class that we require; they have not proved to be such, and they have not the talent that we want.

4412. They have proved that they have talent because they have passed the examination?—In a government yard, but I would extend it to the outside.

4413. Do not you think that nomination by the Admiralty would be an improvement?—Yes, it would be a great improvement.

4414. If they were entered by nomination by the Admiralty do you think that the training which they have in the dockyard would be sufficient?—Not on the present system.

4415. To what do you object?—They ought to have more instructors, and to be looked after better. I would curtail some of their present work and increase other portions; for instance, the time they are going through the boiler shop and coppersmith's and the smithery is entirely lost, but if they devoted that time to erecting it would be much better for them when they had completed their time, and they would know more about engines.

4416. Where were you brought up yourself?—I served my time at a private firm in Lancashire.

4417. With regard to reducing the list of engineers, how would you propose that should be done?—I would reduce the number of engineers and put engine-room artificers in their places.

4418. How would you get the engineers to go, do you think that the present rate of retirement is sufficient?—It would be only fair to give them something better.

4419. Have you any suggestion to offer with regard to what that "something better" should be?—No further than a scheme, giving them a higher rate of retiring allowance.

4420. What retiring allowance should it be?—About £8 a-year for every year served, but I think that 6d. a-day would better satisfy them.

4421. Do you think if that were offered, that the engineers from the top of the list would go, or would they be those that have just entered?—It would be scarcely fair to take those from the top of the list, I do not suppose they would go, perhaps 20 or 30 might not, but below that down to those who had not passed through Kensington or Greenwich would go, it would not be fair to let those who had passed through Kensington or Greenwich go.

4422. Do you think that the senior or the junior engineers would go?—It would depend upon their prospects, I think it would be all those after about 20 down the list.

4423. You think that the prospect of quicker promotion for the first twenty would induce them to remain on the list?—I think it would, those who have qualified for the rank of chief engineer.

4424. Are you aware that there are many men at the top of the list who have not qualified for the rank of chief engineer?—Yes.

4425. Do you know the reason why they have not qualified?—I believe they find that they cannot get in the time to give them a decent retirement, and therefore they would prefer going at an earlier age with a little less pension.

4426. You say that there is another reason for the discontent amongst the engineers, which is the want of comfort. What would you wish to see improved in

their position in that respect?—I think it would be only right to do away with the engineers' mess berth, I do not say altogether at the first start off, but in course of time.

4427. If we got an improved class of engineers taken from a higher social position, it would then be advisable to do away with it you think?—Yes.

4428. Where would you put them to mess?—In the ward-room and the gun-room, according to the time that they had been in the service.

4429. But you do not consider that with the engineers of the present day it would be advisable to put them in the gun-room immediately?—It would better their position, but I do not think that the gun-room officers would approve of it.

4430. Socially it would not be desirable?—No.

4431. But do you not think that, even if the class were improved socially, there would be some complaint about the expenses of those messes?—No; the parents would keep that up, together with their own salaries.

4432. You spoke about their retirement; what would you wish to see altered in that respect?—I think the present retirement is quite early enough. If you could reduce the list by some temporary measure, I would let the retirement remain afterwards as it is.

4433. How much time would you count for retirement?—Thirteen years next January; and at the present scale of pay I am only entitled to £78.

4434. (*Mr. Wright.*) When you retire at 45, you will only get £100?—Yes; and if I serve to 50, I shall only get £30 more.

4435. (*Captain Dowell.*) How much time would you lose for retirement if promoted to the rank of chief engineer?—I should lose about four years.

4436. (*Captain Commerell.*) Do you think that the engineers would be satisfied if their pay were assimilated as nearly as possible to that of the officers in the other branches of the service, holding relative rank?—I do not think they would.

4437. Why not?—Because they have got more responsible and unhealthy duties to perform than the others.

4438. Do you consider then that the officer who sets the engine going which drives the ship is in a more responsible position than the officer who commands her, or than the officer who navigates her?—Yes, to a certain extent, under certain circumstances. I do not say under ordinary circumstances.

4439. Are you taking into consideration that that education which enables them to act satisfactorily in those responsible positions, is at present furnished by the government?—That is the mistake: government

ought not to educate them. When a boy is learning a profession, he ought to pay for it, as I and a number of other engineers have had to do, and not to be paid for it, or at any rate only a very small sum. Mr. J. Mercer, R.N. 20 Oct., 1875.

4440. Then you think that the engineer students should not be paid?—Very little, if anything; they ought not to expect anything for the first three years, and then after that merely a nominal sum.

4441. Have you seen that pamphlet, the case of the engineer officers?—Yes.

4442. Do you agree with it in all particulars?—I do not. I think it is going rather too high.

4443. I think the pay that you have named, and with which, in your opinion, the engineer officers would be satisfied, does not come very much over the ordinary rate of pay of the officers of relative rank?—The first start, 7s. 6d. a-day, would be considerably more. I think it would average more. I do not say that it would average more than a captain.

4444. In fixing that rate of pay did you take into consideration the promotion as it is, or the promotion as you hope it will be?—The promotion as I hoped it would be.

4445. (*Mr. Wright.*) I see that you have not passed your qualifying examination for the rank of chief engineer—what is the reason of that?—My opportunities have been very limited, and I have not seen the slightest chance to get any higher step, so of course I have not troubled about it.

4446. When you came into the service did you expect to have to pass a severe examination before getting promoted to the rank of chief engineer?—No, nothing of the sort was ever mentioned.

4447. You came in before the circular of October, 1863, was issued?—Yes, I did.

4448. (*Mr. Covey.*) You say that you would not be satisfied by seeing the pay of all classes of officers of relative rank in the service assimilated—perhaps in your own individual case you would not care for it, but would you, if you had been made a chief engineer when very young?—I think, under any circumstances, we should be as badly off if we were assimilated to the executive officers, as we should be many years older.

4449. (*Captain Dowell.*) You think if the pay were started at 7s. 6d., and were progressively increased until it reached 12s. a-day, they would be satisfied?—Yes, 12s. per day at the least.

4450. With a prospect of more speedy promotion?—Yes.

4451. At what age ought they to be made chief engineers?—At not later than 35 years of age.

(*The witness withdrew.*)

MICHAEL HARCOURT, Engine-room Artificer, called and examined.

4452. (*Captain Dowell.*) What rating do you hold?—I am an engine-room artificer.

4453. What is your trade?—I am an engine smith.

4454. How long have you been in the service?—Between 19 and 20 years.

4455. What were you before you were an engine-room artificer?—A leading stoker.

4456. To what ship do you belong?—The "Sultan."

4457. Where do you mess in the "Sultan"?—On the engine-room flat.

4458. What sort of a mess place have you?—A pretty good one now; Captain Hoskins fitted our mess up during the last cruise.

4459. Do you mess by yourselves?—Yes.

4460. How many are there in the mess?—Four.

4461. Who cleans your mess?—The chief engineer partly excuses a stoker for that purpose.

4462. Are you satisfied with the arrangements of the mess?—Not exactly sometimes, sometimes the stoker cannot be spared, as he has other duties to perform.

4463. What is the result then?—Sometimes we come up, and our food is not cooked. M. Harcourt. 29 Oct., 1875.

4464. Has that often occurred?—Yes, several times.

4465. Is there only one stoker?—Yes.

4466. Is it always the same man?—Sometimes they are shifted; there is one put on sick duty.

4467. And he cleans your mess?—Yes.

4468. Does he mess with you?—Yes.

4469. How would you suggest to improve the arrangement?—If the man were excused from all other duties to attend upon us, it would improve it.

4470. Where do you sleep?—On the engine-room flat.

4471. As far as the mess itself is concerned, is it satisfactory?—Yes; I like the mess very well as it is at present.

4472. Who looks after your hammock?—One of the stokers.

4473. Where do you do duty at sea?—In the stokehold watch.

M. Harcourt. 4474. How many engine-room artificers are there?
—Three besides me.

29 Oct., 1875. 4475. Are they all, like yourself, men of long standing in the service?—No; the other three have only just joined, and had never been to sea before.

4476. How do they get on in the mess?—They are rather awkward at present.

4477. Do they complain of their treatment on board?—It is not exactly what they expected.

4478. What did they expect; are you aware?—They thought that they would have rather better accommodation than they have got.

4479. Are not they satisfied with the mess?—No.

4480. Do you know what they expect?—They thought they should have a mess berth.

4481. Are they satisfied with their pay?—Yes, at present; but they say they think it ought to be increased as they get on in the service.

4482. With reference to your leave in the "Sultan," how is that arranged; what have you to do?—There is a chief petty officers' leave book, and you have to write your name in that with the date on which you want to leave the ship, and the hour, and the hour you come back; that is taken to the commander every evening for him to sign.

4483. Has that worked satisfactorily?—Yes.

4484. When you come on board the ship to whom do you report yourself?—Not to any one.

4485. Then supposing you do not come on board, does not anybody know it?—They would soon find it out if you were absent from duty.

4486. Where do they muster on Sundays?—In front of the stokers.

4487. Who inspects them?—The captain and officers, when they inspect the others.

4488. Is there any lieutenant?—No, only the engineers.

4489. Do you know if the engine-room artificers who have just entered the service are satisfied with their prospect of a pension?—No, they are not.

4490. What do they want?—They think that they ought to have a little consideration as the pension now is the same as that of first class petty officers.

4491. (*Captain Commerell*.) Do not they rank with chief petty officers?—Yes; but there is no difference in the pension.

4492. (*Captain Dowell*.) Is there any chief petty officer in the service that can obtain his whole pension?—Only the engine-room artificers, that I am aware of.

4493. If an engine-room artificer behaves well he counts his time from the day he enters?—Yes.

4494. Who looks after your hammock?—The stoker.

4495. What do you pay him for doing that?—4s. a month.

4496. Where do you wash after your watch in the stokehold?—With the stokers; that is very inconvenient, as sometimes we have had to wait twenty minutes before we can get a wash, and have to wash after four or five stokers have finished.

4497. Having been a stoker yourself, you do not feel the hardships of having a hammock and so on so much as the other men, I suppose?—I do not take so much notice of that, I have been so long in the service.

4498. Has the master-at-arms anything to do with you in the ship?—Not in the "Sultan."

4499. (*Captain Commerell*.) Are you personally satisfied with your messing arrangements in the "Sultan"?—Yes, if the man appointed to attend to us was excused from all other duties.

4500. That means that you want a servant?—Yes.

4501. Have they got a servant in the chief petty officer's mess?—No.

4502. (*Captain Dowell*.) If you had two stokers, one in each watch, would not that obviate the difficulty?—No, that is how they have got it in the

"Devastation." I was in her for a little while, but it did not answer at all.

4503. Why not?—The men had their work to perform below, and whatever they did for us they did grudgingly.

4504. (*Captain Commerell*.) Where did the engine-room artificers get the idea that they were going to have a separate mess berth?—I do not know.

4505. Did they get it from any circular or printed form, or from any information that they obtained at the steam reserve office?—Not that I am aware of.

4506. Have you, since you have been in the service as an engine-room artificer, found that the executive chief petty officers were down on you or interfered in any way with the engine-room artificers?—I do not know.

4507. I suppose you are aware that there is a certain amount of ill-feeling between them?—Yes.

4508. Can you give any explanation of that?—The engine-room artificers have only just joined the service, and are not acquainted with its rules, and the little technical things on board ship they are not up to; little matters of discipline and such like; the other people who have been in the service nearly all their lives take notice of that, and there is a certain amount of ill-feeling between them on that score.

4509. Have you found that the engine-room artificers, taking into consideration that they have come on board a man-of-war, have been unreasonable in their little difficulties?—Sometimes.

4510. They have not considered sufficiently that there is discipline in a man-of-war, and that everything must give way to it?—Sometimes they have not. I have noticed that several times.

4511. There has not been quite that give and take principle on both sides that there might have been?—No.

4512. To insure the services of first-class engine fitters or first-class engine smiths, what pay do you think we ought to give them on entry?—For the service we ought to have good practical and steady men, and I should say 5s. 6d. or 6s. a-day.

4513. After five years what would you give them?—Another 1s. a-day.

4514. And after ten years?—Another 6d. a-day.

4515. With regard to the engine-room artificers who enter from the shore: to which do you consider they attach the more importance, to present pay, to relative rank and uniform, or to pension?—They have not taken the pension much into consideration, because they have only just joined the service.

4516. They have not discovered the value of it?—They have thought about it, but not much. I think they attach most importance to the pay and messing.

4517. The messing appears to be the principal difficulty?—Yes.

4518. Which do you think that the engine-room artificers as a body would sooner have, to mess by themselves and be as much as possible under the control of the chief engineer, or to be as they are now, and mess with the chief petty officers and have their relative rank?—To mess by themselves and be under the control of the chief engineer.

4519. Have you any opinion to offer about the entry of ordinary smiths into the service as engine-room artificers; by "ordinary smiths" I mean the ordinary ships' smiths; do you think that they are worth so much to the service as a first class engine-smith, or a boilermaker, or an angle-iron smith, or a fitter, and that they ought to command as much pay?—Not quite.

4520. What difference would you put it at, or would you make any difference?—An ordinary smith is worth about 6s. a-day, but a good enginesmith is equal to any man.

4521. I daresay your experience will have shown you that a good many engine-room artificers get into the service who are inferior workmen?—Yes, some are rather inferior I must say.

4522. Would you consider that an ordinary smith-artificer should command the same rate of wages as a thoroughly good engine fitter or boilermaker?—No, M. Harcourt.
not quite.

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(The witness withdrew.)

Mr. MATTHEW BLANK, R.N., called and examined.

4523. (Captain Dowell.) What is your standing?—An engineer, of May, 1866.

4524. In what ship are you now serving?—I am in the royal yacht, "Victoria and Albert," as senior engineer. I am just being relieved from her. I believe the nomination is made for my successor.

4525. How long have you been in the service?—16 years and four months, I joined in June, 1859.

4526. You were seven years before you became an engineer?—Yes.

4527. Will you state to the Committee your opinion of the present position of the engineers in the service, so far as regards their pay and prospects of promotion?—I have given the whole subject very much attention and study, and shall be very glad to give you the benefit of what I know, it is rather a wide subject so that I hardly know where to commence.

4528. When you entered the service what prospect had you of becoming a chief engineer?—I was distinctly told (although I have known since that it was unwarranted) that I should be promoted to that rank in not more than ten years.

4529. How told you that?—The inspector of machinery down here.

4530. Did you suppose that he had any grounds for what he said?—I am wrong in saying that he told me, he did not tell me, but he told others so.

4531. From where did you enter?—I entered at Plymouth. I served my apprenticeship at the Great Northern Railway.

4532. And when you entered the navy you expected to become a chief engineer in ten years?—I entered having that opinion.

4533. What is your prospect now?—As near as I can judge I should say in about four years.

4534. How old will you be then?—I shall be about 43 years of age.

4535. Have you any suggestions to offer to the Committee that you think, if adopted, would tend to reduce the time, and to insure a quicker flow of promotion?—Yes; I will mention what I should consider to be a short, and, I think, practicable way of doing it. I am quite aware that the service cannot promote all eligible men to chief engineers now, but as we came in with the understanding that we should be promoted, I think it is only fair that after a certain time (we will say after five years as an engineer) we should begin to count the time in addition to the small increase of pay, I mean count the time for privileges on promotion and retirement; that would involve no heavy outlay, and it would satisfy a great many, as we have no prospect of promotion at the present time.

4536. (Mr. Wright.) Do you mean that, when promoted, instead of commencing on the minimum pay of a chief engineer, you should commence a little way up due to that time?—Yes.

4537. (Captain Commerell.) After five years an engineer?—Yes, that is two years after being eligible for chief.

4538. (Captain Dowell.) You would commence on 13s. a-day as a chief engineer, instead of commencing on 12s. a-day?—No, not that. I think that the rate of pay should be largely increased.

4539. Have you any suggestion to offer upon that point?—What I say embraces a great deal more than appears upon the surface. I am quite sure myself, and from the ideas of other engineers, that it would meet a great want, and would be no burden upon the exchequer.

4540. Are you of opinion that the number of

engineers might be reduced?—Not under the present circumstances. I think it is highly necessary, but, until a proper substitute has been supplied, chief engineers, I know, will not be willing to undertake the responsibilities that are crowding upon them day by day; that is to say, not with the present class of engine-room artificers.

4541. If there were an improved class of engine-room artificers introduced into the service, do you think that the number of engineers might be reduced?—Yes. My opinion is the opinion of many others also, that the Admiralty must be prepared to maintain the present number. I should not myself like, in the interest of the service, to advocate a reduction of the number of engineers under the present circumstances.

4542. But if a more efficient class of engine-room artificers be introduced, then you think that the number of engineers may be reduced?—Yes; but it will require an immense number of efficient engineers under some name or other.

4543. (Captain Commerell.) You think that the engine-room artificers would be engineers under another name?—Yes; but they must be efficient.

4544. (Captain Dowell.) But without any idea of promotion?—That is the difficulty.

4545. At what age do you think a man should become chief engineer?—I shall be 40 next year.

4546. How young do you think a man ought to be?—I should say 30.

4547. (Captain Commerell.) That is the youngest?—I will not say that, because my present chief engineer, Mr. Sear, was 27 years of age, and he is a very efficient engineer.

4548. What would you consider to be the fair average age for promotion?—About 30. I was a better man at 30 years of age than I shall ever be again; I feel that.

4549. (Captain Dowell.) What are your views with reference to the pay?—Of course you have the scheme before you. I am, as it were, committed to that, because I think it is right; but I would say, knowing the money is a great object, retain the lower grades, say 7s. 6d. for entries, but make it upon the condition that the student, if he be of extra application, may qualify himself for a superior position. I mean to say, that I would make it possible for him to come in in the next step.

4550. In requiring such an increase of pay on entry, are you taking into account that these young officers have been educated for six years in the dockyard, at the public expense?—Yes, I have that in view, because I know that you could not get efficient engineers from the outside, at 9s. a-day.

4551. But these young men we have educated ourselves?—That has not proved a success at present, I believe.

4552. In what way has it not proved a success?—Of course I have not had any experience, I only speak from hearsay.

4553. Do you mean that the social class is indifferent?—I mean that their practical qualifications are indifferent.

4554. You do not think that the engineer students are good practical workmen now?—No, I do not think they are.

4555. Do you think so far that their social position is satisfactory?—No.

4556. Have you any suggestions to offer to the Committee which you think would improve it?—It is decidedly wrong altogether, and it is the particular thing which is keeping us down, I may say that

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Mr. M. Blank, we have an opinion that the Admiralty is doing it with that intention; it gives an excuse for not allowing us the certain amount of social distinction to which we aspire.
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4557. Do not you think that that could be obviated if the engineer students were entered by nomination by the Board of Admiralty, instead of by open competition?—Yes, there should be some guarantee that the parents are able to keep them in a respectable and decent manner as well. I know that at the present time the students are not kept up to the mark; their physique is bad; they have to study hard, and their parents, in some instances, have not the means to provide them with sufficient food even.

4558. Would not that be obviated by nomination by the Admiralty, who would not nominate anybody but the sons of gentlemen?—Yes; to a great extent it would.

4559. (*Captain Commerell.*) The sons of half-pay officers?—Just so.

4560. (*Captain Dowell.*) With regard to the mess, is it the wish of the engineers now that they should be introduced into the gun and ward-room messes?—Yes; of all those it would be in the interest of the service to retain.

4561. You are of opinion, I gather, that all officers whose social position is such that you would not advise their being admitted into the gun and ward-room messes, had better not be retained in the service, is that what you mean?—Yes, that is what I mean; and there are many of those in the service at present. I do not think it is any disgrace, it is only justice to say we feel that a great number of our own class are not fit to go into the gun and ward-room messes. Eventually we hope that such a thing will be done away with, but the pay is not sufficient for it now.

4562. (*Captain Commerell.*) Not sufficient to keep you in the ward or gun-room messes?—No, I can hardly live now; it is only starvation.

4563. (*Captain Dowell.*) What is your pay now?—10s. a day. I have been senior engineer of the Royal yacht, and have all the responsibilities of that position with nothing extra for it, and I have to keep up as decent an appearance as I can, and I find I cannot live properly. I have been very unfortunate in the service in many matters which I could perhaps explain.

4564. You say that you think the pay should be in an increasing ratio, is this what you mean (referring to the case of the naval engineers), but altering this to 7s. 6d. a day?—Yes, I approve of that.

4565. After seven years' service an engineer would receive 15s. a-day?—Yes; it is three years since that was drawn up, and even in that time matters are changing so much that I would scarcely like even to confine myself to that.

4566. In what way are matters changing?—I mean that money will not go so far as it did.

4567. Does not that bear the same upon all of us, if you increase the pay of the engineers in this way, because money has deteriorated in value, must not the Admiralty increase the pay of every other officer in the service in the same way?—Engineers, as a rule, come into the service for a living, and to obtain that they give up the comforts of living on shore, for the purpose of getting good pay; that is what I joined for; the other officers come into the service for what I call honour and glory. As our duties and responsibilities are increasing, I go in for money's worth, and there is no class, from the inspector downwards, that has got anything like sufficient pay.

4568. Supposing any engineer in the service was at once discharged, do you think he could get higher pay?—No; not now, unfortunately, many of us are physically unfit, and nothing has been done to compensate us for that. I have been unfortunate myself; I may say very unfortunate in that respect. Many at the top of the list of senior engineers, and junior chief engineers are not fit to be sent to a foreign station at all. Mr. Covey knows that, and a number of officers at the top of the list, as far as physique

goes, are worth double the number at the bottom of the list.

4569. Is that the result of climate?—Yes; and the work has been gradually increasing; it used to be all wooden ships, and that kind of thing. I cannot, perhaps, account for it exactly, but it is nevertheless the case. I could pick out twenty chief engineers, or senior engineers, or even forty, who are really and truly not fit to serve.

4570. Have you any suggestion to offer to the Committee in reference to the half-pay of chief engineers?—The present half-pay of a chief engineer, considering that he has served 20 years and has to remain 12 months on half-pay, is something altogether disproportionate.

4571. Is this scale of half-pay your idea of what it ought to be?—Yes. I know cases of extreme hardship, from no misconduct or recklessness on the part of the officers. I know a case of extreme hardship.

4572. Of officers being kept on half-pay?—Yes; I know of one chief engineer who really had to reduce his children's allowance of food.

4573. Have you any other suggestions to offer to the Committee?—I represent a very large class in the service, the senior engineers and junior chiefs, who came in, as we did, under great inducements; we entered, and went on board ship to take a watch from the first, and did not cost the government a farthing for our education. Of course we were not so highly educated as those engineers who now come into the service, in mathematics, and the higher branches of knowledge, but we were sufficiently educated, both practically and theoretically, to go below and take a watch, and we have done our duty all the way through, so that we have a claim upon the government which the other engineers have not. We do not owe our education to the government, we were educated when we joined the service, and we joined expressly with the idea of being promoted, and we think we ought to have some substantial recognition of those services, and some remuneration for our loss of promotion.

4574. What substantial recognition and remuneration do you expect?—There are some that have not qualified for chief engineer. By an Admiralty regulation their lordships thought fit to command that a strict examination should take place before Dr. Woolley's certificate could be obtained, and a good number of serviceable engineers could not pass that examination.

4575. (*Mr. Wright.*) You refer to the circular of 1863, I presume?—Yes, they feel it very hard that they who have been serving for the whole of their time, just as efficiently as any other engineers, should be debarred thereby from the benefits of promotion and the benefits of good retirement.

4576. (*Captain Dowell.*) What retirement do you think would meet their case?—6d. a-day for every year's service. In my own case, and in the case of officers similarly situated, who have qualified and have passed Dr. Woolley's test, and whose certificates are right, to be debarred by age or any other circumstance beyond our own control does not seem fair, and we ought, I think, to have a more substantial recognition.

4577. What would satisfy you?—Nothing less than my present full pay.

4578. What is that?—10s. a-day. I think after 20 years' service it should not be less than £200 per annum. If I am debarred from being promoted from any cause beyond my own control, being qualified and otherwise fit for promotion, then I think, having at the present time not less than 10s. a-day, if I serve for 20 years I think that £200 a-year is not too much.

4579. (*Captain Dowell.*) Have you any other suggestions to offer?—I think that more attention ought to be paid to the entry of engineer students; their physique at the present time is very low, and I do not think they are fit to cope with the work which they will have to perform. That is my opinion, from what I have seen of them.

4580. (*Mr. Wright.*) They pass the doctor before going into the dockyard, and also before entering into the navy?—Yes; but there are few big men amongst them. I think it is impossible for men, studying as they do, to have the proper physique.

4581. (*Captain Commerell.*) Do you think that they have too much study?—Yes. Then with regard to the chief engineers, there is the eleven years, that I do not see any excuse for at all.

4582. (*Captain Dowell.*) You think that ought to be altered?—Yes, decidedly; it is very bad. Senior engineers of ships have no extra emoluments either, they have sometimes very onerous duties to perform, and they get the same pay as those who are serving with them; they have no extra remuneration, and no hope of anything extra, and nothing at all to encourage them for doing extra duties; take chief engineers of ships like the "Sultan" and the "Minotaur," for instance.

4583. You think that the chief engineers' allowance for being in charge of engines should increase with the size of the engines?—I speak of the senior engineers.

4584. Only senior engineers are put into large ships?—I think that senior engineers having extra responsibilities should receive extra pay, just the same as gunnery lieutenants, they are at work at all hours. I should like just to touch upon the unprofitable employment of engineers, that embraces the artificer class, and their employment in the steam reserve. I think that the employment they get is very unprofitable.

4585. What employment do you mean?—Having to do manual work, which they are obliged to accept, although very degrading.

4586. Do not you think it is positively necessary that an engineer should be capable of doing manual labour?—Most decidedly. I cannot speak too strongly upon that point.

4587. But being able to do it, you mean that he ought not to be expected to do it, except in cases of emergency?—Yes, that is it.

4588. And be otherwise only a superintendent?—Yes; I speak of their dockyard employment when in steam reserves more particularly.

4589. If the number of engineers be reduced and the number of engine-room artificers be increased, would not that necessarily be the case?—Yes; but at the present time there is plenty of field for employment. When on board ship we are expected to take charge of torpedoes and guns, and those sort of things, and we really have no instruction in matters relating to the construction of ships. We have to go on board and take charge, when promoted, of engines and ships of which we have no knowledge.

4590. The present instruction in the dockyard of the engineer students, comprises, during a portion of their time, attendance upon a ship?—Yes; but, at the present time, those coming forward as chief engineers know nothing about it.

4591. Do you advise that the engineers at present in the service should be so employed?—Yes, there is another point which I should like to touch upon, which is the chemistry of boiler preservation. We are in a state of most lamentable ignorance upon that point. There is also the cabin accommodation that we have not yet touched upon. With regard to that, I think it is highly necessary that a senior engineer, who has to turn out at night, should have some place to which he would be able to retire, just to snatch half-an-hour's sleep.

4592. In the fitting of ships it is difficult to provide cabins for all, do you think that the engineers would be at all satisfied if there were a cabin appropriated to three seniors, in which they might have a sleeping berth?—Half a loaf is better than no bread.

4593. Do you see any difficulty in that?—Yes, I do.

4594. You must remember that if things are carried out as is wished both by the Admiralty and the engineer officers themselves, promotion will be so much more rapid that no man will arrive at the age of 35

without being a chief engineer, then the hardship would be much lessened?—Yes; the number being reduced the difficulty would be less, and in new ships there is plenty of room for cabins. Generally the seniors have a cabin; they gave the senior a cabin in the "Hercules," Mr. White.

4595. Were you ever on board the "Hercules"?—Yes.

4596. Where was that cabin?—Mr. White told me of it.

4597. Have they a cabin on board the "Minotaur"?—I think not. In the "Bellerophon," I believe, they have duplicate cabins. Where there are so few guns, there is more space. There is one point that we very much complain about in Mr. Childers' circular; we were taken away from the officers of our own rank, and classed with warrant officers.

4598. In what way?—The assistant-paymasters, you will see in the regulations, come immediately after the paymasters; but we were left out, and not treated as officers at all; we were simply put after warrant officers, which gave very great offence.

4599. (*Captain Commerell.*) You are after the chief engineers?—Yes, in that list; we want to be placed on the other list.

4600. On what list?—On the retirement list.

4601. (*Captain Dowell.*) What I understand is that you want "retirement" instead of "pension," and to be retained in the Navy List?—Yes, and to come in the same way in the Navy List as we do now, before surgeons, and so on. It was intended, at one time, to make us executive officers, on account of our having charge of men; the chief engineer now has often charge of 100 men.

4602. (*Captain Commerell.*) What do you mean by this statement, "the great reduction in the number of engineers on board all classes of ships." Do you consider that the number of engineers has been reduced?—It has been reduced considerably. In the "Bacchante" they originally had six engineers, and it was afterwards reduced to four.

4603. (*Mr. Wright.*) She has two artificers in lieu of a junior engineer?—Yes, I believe so.

4604. (*Captain Dowell.*) Have you any further suggestions to offer?—I think the lower grades might be reduced with advantage to the service. I would do away with the assistants.

4605. Starting them first as engineers?—We might retain one as a probationary one.

4606. But do away with the second class assistants?—Yes; and, of course, increase the number of chief engineers, and employ them in smaller vessels.

4607. In small vessels there must be a certain risk of the engineer in charge having to take watch. Do not you think that a chief engineer would be less willing to do so?—He would not like it, but I do not think he would object to it; they have to do it now. I do not know whether a copy of this pamphlet is before the Committee, but it is just a summary containing a statement of the disabilities of the royal naval engineers (*handing the pamphlet to Captain Dowell*). Here is a letter also bearing upon the subject (*handing in the same*).

4608. (*Captain Commerell.*) Have you ever taken into consideration, that if we reduced the list of engineers very greatly, what we are to do for engineers in time of war. If a war broke out suddenly, where would you get your engineers from. I suppose you are aware that during the Crimean war we were placed in great difficulty and had to go to all sources, getting in many cases very indifferent men. How would you propose to obviate that?—It only wants money. It is simply a matter of pounds, shillings, and pence.

4609. It has been stated in evidence that we were paying as much as £16 a-month to the second engineer on board ship, while the chief engineer was only getting £12 a-month?—Yes; it was all done in ignorance.

4610. And the men were utterly inefficient in every possible way?—Yes, I quite believe that.

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4611. Do not you think that we must make it a subject of study to find out from where the engineers are to come?—Certainly; we have proposed to improve the position of the engine-room artificers, and I believe that there will be no lack of men if the money be certain.

4612. Supposing a large number of engineers were retired, would you propose to put in the order which retires them a clause that in case of war they should come forward, provided they had not arrived at a certain age?—I am afraid that the majority of them would not be worth having except for home service, for the reason I gave just now, that they are physically unfit to be of much good.

4613. Do you consider that money alone would give us a sufficient number of men?—Yes, that is of course provided that the treatment is improved.

4614. What do you consider would be the proper pay on entry to induce a thoroughly good engine fitter to enter the service?—I do not think it should be less than 6s. a-day.

4615. What pay would you give after 5, 10, and 15 years' service?—I would not put the increases so far apart, it looks like working at a dead horse. I think if they had an increase as often as possible, even if it were only small, it would act as a great incentive.

4616. You think that a small increase quickly is better than a large increase slowly?—Yes; but I know it is against the Admiralty to do that. I should say that 8s. or 9s. a-day should be the maximum at present.

4617. Do you think that with that pay the present pension is sufficient, bearing in mind that they are the only class of chief petty officers who can attain to the maximum pension of chief petty officers?—No, perhaps it might be now, but I imagine that in the

course of a few years it would not be sufficient to encourage a man to come in.

4618. (*Captain Dowell.*) Not £1 a-week?—No, there are men leaving now with £45 a-year, boat-swain's mates and that kind of people.

4619. (*Captain Commerell.*) You must remember that that man has served his country in all climates for many years?—I do not say that it is too much for that man.

4620. You must remember that if you succeed in making one class contented, you may make another very discontented?—A mechanic who has got his trade in his hands is independent, the workers in metals are as a rule most independent.

4621. Do you consider that we could with safety to the country, look to the engine-room artificers for any sudden expansion required in the event of war for working the engines of our ships?—I do, they have had considerable experience amongst private firms.

4622. Would you yourself like to be sent to sea as a chief engineer with an engineer under you, and all the rest of your department engine-room artificers?—Not the present class of engine-room artificers.

4623. But with the engine-room artificers whom you hope to see in the service?—Yes; I should suggest that the coming engine-room artificers should be equal in all respects, with the exception of the educational test, to the engineers who joined the service up to the time of the entry of engineer students.

4624. Do not you think that if we get that class of men, we are only at present putting off the day when they will want cabins and so on; they want tail-coats now?—No, give them money instead, rank will not do them any good.

4625. You are not an advocate for rank?—No, I am not.

(*The witness withdrew.*)

WILLIAM BARRETT, Engine-room Artificer, called and examined.

W. Barrett.
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4626. (*Captain Dowell.*) How long have you been in the service?—Four years last February.

4627. In what ships have you been serving?—In the "Black Prince," for a short time, in the "Ringdove" in China, and likewise in the "Thalia," on my passage out to China.

4628. Where are you now serving?—In the "Excellent."

4629. What are you doing there?—Running the first launch.

4630. Are you driving the engine of the first launch?—Yes.

4631. Where do you mess in the "Excellent"?—With the chief petty officers.

4632. Have you a comfortable mess?—Yes, very comfortable indeed; it is an exception to the general rule.

4633. Where did you mess in the "Black Prince"?—With the chief petty officers, on the lower deck.

4634. Were you comfortable there?—No, not at all comfortable; sometimes when I came off watch from the stokehold there would be no food laid for me, and I had to get it the best way I could, or go without it.

4635. Where did you mess in the "Thalia"?—In the blue jacket chief petty officers' mess; the master-at-arms by himself, the ship's steward by himself, and the schoolmaster by himself.

4636. Were you comfortable there?—No, very uncomfortable indeed.

4637. Where did you mess in the "Ringdove"?—With the corporal of marines, the ship's steward, chief gunner's mate, chief carpenter's mate, and ship's cook.

4638. Were you comfortable there?—No, very uncomfortable there.

4639. (*Captain Commerell.*) You have been unfortunate?—Yes, very; my present time is the pleasantest time I have had since I have been in the service.

4640. (*Captain Dowell.*) Where were you before you entered the service?—I worked in a private firm and for government in the big smithery at Portsmouth dockyard, as an angle-iron smith; I also worked as a smith in Wiltshire and in London.

4641. What is your trade?—An enginesmith.

4642. What are the wishes of the engine-room artificers generally with respect to their mess?—We wish to be more comfortable. I think I speak for the whole of them in saying that we want, and would like to have, a separate mess apart from the lower deck, or some place where we could be comfortable together by ourselves; but if there was only one engine-room artificer, as was the case with me on the China station, it would be better to have a separate mess from the blue jackets on the lower deck.

4643. If you were alone, would you rather mess by yourself than have any other chief petty officer with you?—No, that is a mistake. I should like to have some one to mess with, but still be distinct from the lower deck.

4644. You do not object to messing with the chief petty officers?—No. I have found the blue-jacket chief petty officers very companionable men, and men that I could agree with; but it is being allied with men that you have to control at times which is objectionable.

4645. Who looks after your hammock?—I always pay a man for that.

4646. What do you pay him?—I paid one dollar a-month in China, as a rule 4s., I paid that in the "Black Prince" and also in the "Thalia."

4647. You do not have a hammock in the

"Excellent," I presume?—No, not in the "Excellent," we generally pay a good price in order to get it attended to.

4648. What is the general feeling about the size of your chest?—I should like to have a large size one; I had a large size one when I first came into the service and I was satisfied with it.

4649. What size do you think would be sufficient for your clothes?—The size I had when I first entered the service was 3 feet 4 inches by 2 feet by 2 feet; I had it with a compartment in which to put dirty clothes and boots, so that when I came out of the stokehold I could put my dirty clothes in until I chose to send them ashore to be washed. I have got into boilers and the dirty suit I have had to take off I have been obliged to stow away with my white shirts with the present size of chest.

4650. You would be satisfied with the original size?—Yes, that is adequate to all I want, 3 feet 4 inches by 2 feet by 2 feet.

4651. You have been four years in the service?—Very nearly five years.

4652. Is it your intention to re-enter at the end of 10 years?—That will depend, provided I am paid better for my labour and am made more comfortable. I do not dislike the service except for the fact that in large ships one is very very uncomfortable, and mechanics are made comfortable at home.

4653. You do not consider that your present pay is sufficient?—No, far from it.

4654. What should it be in your opinion?—I consider myself now, after five years' standing, to be worth 7s. 6d. a-day.

4655. What were you worth when you entered the service?—I was getting 5s. a-day, and then trade was very bad.

4656. You got 5s. a-day in the service?—Yes, and I left 5s.

4657. You got 30s. a-week on shore, and directly you came into the service you got 35s. a-week?—Yes, but I had to work on Sundays.

4658. Do not you take into consideration the rations?—I have had to pay a considerable amount to get necessary food.

4659. But not what you would have to pay if you were keeping yourself on shore?—But you must look at the advantages we have on shore; we can get overtime and we have the privilege of working piece-work. I consider that the privileges which a good mechanic will receive in a private shop are quite equivalent to what one gets in the service, supposing we were paid at the rate of 7s. 6d. a-day after five years' service.

4660. You do not take into consideration the leave that you get without loss of pay. If you were working in a private yard and wanted an afternoon's leave, you would have to lose an afternoon's pay?—But, if working on shore, I am at home at night; in the service I am kept on board one night out of three.

4661. How much do you think a man should receive on entry?—I consider that on a man entering the service, his pay should not be less than what I am getting now, 5s. 9d. a-day. I would put it at 6s. a-day to get thoroughly good mechanics into the service.

4662. And you think that after five years' service it ought to be 7s. 6d. a-day?—Yes; I think so.

4663. And should it increase after that?—Yes, I think so; according to a man's ability, after serving for a few years in the service there should be some encouragement for a man to persevere.

4664. Supposing a man has served 10 years, what would you give him?—I do not think 8s. 6d. a-day would be too much to pay, in order to have good men.

4665. For the remainder of his service?—Yes.

4666. Do you think it would be any inducement for a man to remain in the service if he had a prospect of being made a warrant officer?—I do not think that would meet with the approbation of the engine-room artificers. I do not think that they would care about remaining in the service until they were 50 or

60 years of age, and not competent to do their work.

4667. Do you think that the pension is an inducement to them?—I think that many enter the service on account of the pension, although it is not very great, according to the present arrangement. It states in the Admiralty regulations that the pension is to be the same as that of chief petty officers.

4668. How much is that?—About £52 a-year, I think.

4669. Surely £1 a-week is not a bad retirement. What age were you when you entered the service?—Very nearly 26.

4670. And at 46 years of age you will receive £52 a-year for life, while you will be young enough, and will have had experience enough to enable you to obtain a high position elsewhere to add to that amount?—I do not think that it is quite sufficient; I think that we should have at least two-thirds of our pay as pension.

4671. Supposing your pay to be 8s. a-day?—Yes, after 20 years' service; of course taking into consideration that we are of good character, and have been so all the time.

4672. Do you really mean to say that you think you should receive £100 a-year?—When I stated two-thirds just now, I did not take into consideration for the moment what it was; but it is rather too high. Speaking fairly, I think that a man, after 20 years' service, should at the least get £75 a-year.

4673. Have you any reason to complain of your uniform?—I should like to have a more suitable uniform; I do not care about this jacket at all.

4674. Why not?—For this simple reason, that I do not think it is at all becoming for a man.

4675. What would you like to have?—A coat of some sort.

4676. Do you think that a reefer would do?—Yes, a coat of that sort would look far better than this jacket, this puts me in mind of a slop jacket more than anything else.

4677. (*Captain Commerell*.) How old are you?—Turned 30 years of age, I shall be 31 in the course of two months.

4678. Have you any other complaint to make of your treatment in the various ships in which you have served beyond the messing arrangements?—There is one thing that I should like to have altered, which is this: I would like to be placed out of the control of the master-at-arms, as I find his control very obnoxious. For instance, I might be at work below, and I have been told that I might have leave when I had finished my work, well when I go to the master-at-arms, and tell him that I want leave, he would put some obstacle in the way, he must see the commanding officer, and could not do it now because the commanding officer was at dinner, and all that sort of thing.

4679. Are you aware that no one can leave the ship without the permission of the commanding officer?—I think that some arrangement might be made for getting our leave through the commanding officer, without its being in the power of the master-at-arms to put an obstacle in our route when so inclined.

4680. How do you get your leave on board the "Excellent"?—Through the master-at-arms, without any obstacle at all. It is very very comfortable indeed on board that ship. We all mess together and no distinction is made.

4681. Have you found any distinction to be made in the ships in which you have served?—In the "Thalia" the master-at-arms messed by himself, and when I wanted leave to go on shore, and told the master-at-arms that I wanted it, he would say, "as soon as convenient I will see the commanding officer."

4682. (*Captain Dowell*.) You went to the chief engineer first of all, I suppose?—Yes; and I told the master-at-arms that I had leave from the chief engineer, but he said, "he has nothing at all to do

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with it, it must come from the commanding officer," and I had to wait until he chose to see the commanding officer.

4683. (*Captain Commerell*.) What pay were you receiving when you came to sea?—5s. a-day.

4684. Did you get overtime?—Yes.

4685. Have you ever received any check money for working on board other ships?—Yes, for the "Frolic."

4686. How much did you receive?—3s. a-day.

4687. How many extra hours did you work?—I worked 10 hours a-day, and then I had my 5s. 9d. a-day and 3s. a-day check money, that made my pay 8s. 9d. a day.

4688. Do not you call that good pay?—Very good indeed; I should always like to be working at that price.

4689. You would like to be paid twice over for the same job?—It was a case of emergency; the "Frolic" was under orders to get to sea, and her boilers were leaking badly, and I had to take some tubes out and put new ones in.

4690. Do you think that the engine-room artificers, in calculating the various disadvantages of the service, have fairly weighed against them the numerous advantages which they derive; first of all, there is the pension, a pension which you would get nowhere else; secondly, there is payment for leave, which you would get nowhere else; thirdly, there is your ration money, which amountet to 7s. 7d. a week; fourthly, you are attended by a doctor without any charge whatever, and can go to the hospital if sick; and fifthly, you are paid for seven days a-week instead of six. Now, do you think that you ever fairly look on one side as against the other?—Yes; I think the thing has been carefully weighed; I have weighed it carefully myself, and I think, to take a choice between the two under

the present circumstances I would rather be on shore.

4691. Are you a married man?—Yes.

4692.. When did you marry?—Eight years back, three years before I came into the service.

4693. Should you consider that the hours you work on board ship are as long as the hours that you work on shore, and that the work is as hard?—No, the hours are not so long, and the work is not so hard, but still, if we work for a private firm on shore, we have not the humbug that we have on board ship.

4694. (*Captain Dowell*.) What do you mean by "humbug"?—When we consider that we have done a day's work as mechanics on shore we can go home; but in the service we cannot go ashore when we like; then again, if we work extra time for a private firm, we get extra pay for it, and so on.

4695. (*Captain Commerell*.) What sort of a state do you think the service would be in if in a ship with 700 men anybody was allowed to go on shore when he thought he had done enough?—It would not do at all.

4696. Do you consider that an increase of pay would compensate you for what you seem to think you have lost?—Yes, I do. I consider that if we had an increase of pay, and were made more comfortable on board ship in the mess arrangements I believe that we should feel compensated and be comfortable and happy. There is one thing which I think that engine-room artificers would be very very pleased with, and that is, even supposing the pay was a little bit less, that some provision should be made for the widows afterwards, in the same way as in the case of the warrant officers. I think that would meet with general approbation.

4697. That lies in your own hands; why not insure your life?—That does not always stand good; they break sometimes.

(*The witness withdrew.*)

WILLIAM WALKER, Engine-room Artificer, called and examined.

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4698. (*Captain Dowell*.) How long have you been in the service?—Sixteen years.

4699. What were you before you became an engine-room artificer?—A leading stoker.

4700. What is your trade?—A fitter.

4701. In what ship are you now serving?—In the "Asia."

4702. Have you ever been at sea?—Yes.

4703. In what ship have you served as engine-room artificer at sea?—In the "Immortalité."

4704. (*Captain Commerell*.) During the last commission or the present one?—The last one; Captain Graham and Captain Sullivan.

4705. (*Captain Dowell*.) Is she the only ship that you have been to sea in as an engine-room artificer?—Yes; the only sea-going ship.

4706. Where did you mess in the "Immortalité"?—In the second mess, right forward on the starboard side.

4707. Who were your messmates?—The school-master.

4708. Anybody else?—No.

4709. Were you comfortable?—Not very.

4710. How many more engine-room artificers were there?—Only one besides myself.

4711. Why were you not comfortable?—Because we sometimes had to clean our own mess out, and the mess was such a long way from the stokehold that we were continually being found fault with for making a mess in going from the stokehold to it.

4712. In the way of a mess place, what would you like?—A place secluded from the rest of the ship's company.

4713. Do you like messing with the other chief petty officers?—No.

4714. You would rather mess by yourselves?—Yes; much rather mess by ourselves.

4715. Where do you mess in the "Asia"?—I have no mess there.

4716. Do you live on shore?—Yes.

4717. What is your pay?—5s. 9d. a-day.

4718. Do you purpose re-entering the service at the expiration of your 10 years?—I am in my last 10 years. I am completing my time.

4719. Are the engine-room artificers generally contented in the service?—No; as far as I can see they are not.

4720. Do you know why they are not?—I do not think they are satisfied with the pay they get.

4721. What do you think is the pay that would satisfy them, or that they could reasonably ask for?—I think if they had more pay on entry, and to rise continuously after a certain number of years it would satisfy them.

4722. With what pay would you start them on entry?—I think I would start them on 6s. a-day, the same as they have in private firms.

4723. That is only for six days in the week, the 6s. 9d. a-day for seven days in the week is more than 6s. a-day for six days in the week, what should it increase to?—To 7s. 6d. in five years, and 9s. a-day for the remainder of the time up to ten years.

4724. Do you think it would be an inducement to the men if they were to be made warrant officers?—I do not think so.

4725. Is the pension any inducement for men to enter?—Yes, but not so much as present pay.

4726. Do you think there are many positions in private firms that men can get like the one you are

now holding in a pecuniary way, 5s. 9d. a-day and 1s. 1d. a-day allowed you for your rations, making a total of nearly 50s. a-week?—No, I do not think so as regards the pecuniary part of it, but they have more comforts, being at home.

4727. In your position you are at home?—Yes, I am at present, but I may be called upon to go to sea to-morrow.

4728. How long have you been in your present position?—Twelve months since last April.

4729. How do you go to sea, on a regular roster?—They have particular work here, and they do not call upon us.

4730. What is your particular work?—The White-head torpedo.

4731. Then I suppose you are pretty well safe for the remainder of your time?—I have been given to understand so.

4732. What pension do you expect to get at the end of your time?—I do not expect any other pension than that of a chief petty officer.

4733. Have you calculated up how much that would be?—No, I have not.

4734. Have you got all petty officer's time?—Only about 10 years.

4735. Can you tell me at all what other grounds for discontent the engine-room artificers in the service have?—There is the chest; it is too small for the wants of the engine-room artificers going to sea. It will not contain stock enough.

4736. You think that it ought to be larger?—I do. W. Walker.

4737. Are the engine-room artificers generally satisfied with their uniform?—They consider that a jacket is not a proper outer uniform, and they think that they ought to have a coat. 29 Oct., 1875.

4738. What sort of a coat would they like to have?—A dress coat for mustering, and a reefing jacket for undress.

4739. Did you ever keep watch in the "Immortalité" in charge of the engines?—Yes, on two occasions; and I had also charge of the engines of the "Comet" gunboat while the engineer was in hospital.

4740. Continually working?—Two or three times a-week.

4741. Do you feel yourself competent to take charge of engines?—Yes; a small pair of engines. I took charge of the engines in the "Immortalité" by order of the chief engineer on two different occasions.

4742. When the ship was at sea?—Yes.

4743. (Mr. Wright.) How was it that you, a fitter by trade, went to sea as a stoker?—It was only the foolishness of youth.

4744. Did you serve an apprenticeship as a fitter?—Yes.

4745. What age were you when you went to sea as a stoker?—Close upon 20.

4746. How long had you been at your trade before as a fitter?—For five years.

(The witness withdrew.)

[Adjourned to Wednesday, 3rd November, at 10 o'clock.]

WEDNESDAY, 3RD NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

Mr. JOHN B. STEVENS, R.N., called and examined.

4747. (The Chairman.) What is your standing as an engineer?—Ten years; I was in the college last session.

4748. You were promoted in 1865?—July, 1865.

4749. Did you enter the navy before the engineer students were established?—I did.

4750. From where?—From Lancashire I had been, but at the time I entered the service I was engaged as a draughtsman in a consulting engineer's office.

4751. When did you pass into the service?—In 1858.

4752. Have you qualified for the rank of chief engineer?—Yes, I have done so.

4753. When?—In 1866 I think it was. I passed Dr. Woolley in Christmas, 1865, obtaining a first class certificate, and qualified for chief engineer afterwards.

4754. You passed the educational examination?—Yes, in Christmas, 1865.

4755. Just after you joined the service?—After I was made an engineer.

4756. Where did you obtain the necessary educa-

tion to enable you to qualify?—At school part of the time, and, I suppose, from lectures during the latter years of my life. It is but fair for me to state that I also had an opportunity while in the "Osborne" for some months of attending the college at Portsmouth, and I was generally able to take advantage of that at short intervals.

4757. During the time that you served your time did you go to school?—Yes, in the evenings.

4758. To a private school?—Yes.

4759. When do you expect to be made chief engineer?—Never.

4760. How old are you?—44 years of age.

4761. You must have entered the service rather late?—I was 26 when I entered the service, and the limit of age in those days was 28.

4762. Are you sorry you qualified for a chief engineer or not?—That remains to be seen, but I can say that at present I do not know whether it is to my disadvantage or not.

4763. Supposing the present regulations remain unaltered?—It depends upon the construction put

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upon them; I believe it is an open question, whether we are debarred or not, from retiring at the age of 45.

4764. By the regulations, a man who has qualified for the rank of chief engineer, cannot retire before the age of 50?—In that case, I am sorry that I qualified.

4765. Where are you serving now?—On board the "Triumph."

4766. What are you there?—The senior engineer.

4767. Under a chief engineer?—Yes.

4768. Do you keep watch in that ship?—Yes.

4769. You do as senior engineer?—Yes.

4770. How many engineers and engine-room artificers are there?—Four engineers, one assistant engineer, and four engine-room artificers.

4771. (*Captain Dowell.*) Six engineers including the chief?—Yes.

4772. What is the horse power of the "Triumph"?—800 horses nominal.

4773. (*The Chairman.*) You keep watch?—Yes.

4774. Do the engine-room artificers keep watch?—Yes, in the stokehold.

4775. What trades are they?—Three engine fitters and one boilermaker.

4776. How many of them keep watch?—Three.

4777. What trades are those men?—Two engine-fitters, and the boilermaker, the third engine-fitter stands off to do any work that may crop up.

4778. Do they ever assist to keep watch in the engine-room when steam is up, starting and stopping the engines?—No, there is no necessity, the regulations are, that when going in and out of harbour, some of the officers, "off watch," shall go into the engine-room to assist.

4779. When cruising with the fleet you will require the artificers to start and stop the engines?—There is no necessity for them to do it.

4780. And they do not do it?—No; we decided that the duties will not admit of taking them out of the stokehold.

4781. Are you aware whether any have got a certificate stating that they are qualified to take charge of engines?—No.

4782. Are they acting or confirmed?—They are all confirmed, and have been watch keepers.

4783. What do you call "watch keepers"?—Taking charge of an engine-room watch in small ships.

4784. All of them?—I know that three of them have.

4785. Do you consider that the progress of promotion to the rank of chief engineer is now satisfactory?—No, it is not.

4786. What would you suggest to improve it?—A larger number of chief engineers on the list; and I would couple with that this remark: that I would put them into smaller ships than is now the case. It is not much use promoting them unless they are employed. Of course it is recognised that everybody cannot be made a chief engineer, and I would therefore respectfully suggest that some scheme should be adopted which would compensate those who, like myself, cannot be promoted to that rank.

4787. By giving some retirement?—Yes.

4788. Would a step in rank at the time of retirement be an inducement for a man to go?—I do not think so.

4789. They do not want any inducement to go?—No.

4790. On what scale of retirement would you allow them to go. Supposing the Admiralty was to say to you, "You can retire now," under the present regulation, what scale of retirement would you get?—I should be entitled to £108 a-year.

4791. That is due to your length of service?—Yes, 18 years at £6 a-year.

4792. If the Admiralty were to allow you to go, would you go?—Certainly, I would.

4793. Do you think that a large number of men would do the same thing?—If you can believe what they say, they profess to be very anxious to go.

4794. Do you think that if all men over 40 years of age were allowed to retire on a certain scale of retirement, that a large number would go?—Yes, I think so.

4795. Would they go on the present scale of retirement?—I would not like to say. I can only speak for myself.

4796. (*Captain Dowell.*) Would you?—Yes.

4797. (*The Chairman.*) Supposing you went, where would you get employment?—It is possible that I may be peculiarly circumstanced, in the first place, I could get employment in the merchant service as a chief engineer, and I also think I could get employment in mercantile life, out of the trade altogether.

4798. On shore?—Yes.

4799. Supposing when engineers were retired a regulation was made that they were bound to serve their country again in time of war, do you think that would be a check to their retirement?—Yes, a very great check.

4800. They would not like to serve the country in time of war?—They would be very glad to serve the country then, but such a regulation would interfere materially with other people giving them employment. If I went into the market to seek for employment with that hanging over my head, it would debar me from obtaining employment very much, because I should not go to seek employment as a handycraftsman or day-labourer, but I should seek employment in some place where I was put in a position of some little responsibility, and no employer would care to place a man in that position who might be taken away at a moment's notice.

4801. Supposing with that regulation there was coupled a condition that only those men who were highly thought of in the navy were bound to serve during a war with a slight increase of pension?—I think that would make it rather worse, for if the regulation were objectionable generally, it would be still more so if enforced only against the best men.

4802. Would not that rather be a testimonial to them, showing, to the private trade, what their value was. In time of war a great many steamships are thrown out of work?—But in time of war is there not an enormous number of transport ships?

4803. Yes, but taken up for the government service?—Employed under mercantile firms.

4804. If it were a war requiring the transport of troops no doubt a great many merchant steamers would be wanted, on the other hand, with a maritime war, would we not require a large number of merchant vessels to be taken up by government to be turned into cruisers, and would not also a great deal of the foreign trade of the country be at a standstill for the time?—That may be so, but I am afraid that the fact of having to return to the service would be a great bar. When a man leaves the service he does so with the idea that he is going to settle down; but the fact of a man being liable to be called upon at some future time would debar him from getting employment in the market.

4805. Permanent employment?—I am viewing the case from my own experience and knowledge of the mercantile world, as well as of the service, because I have a knowledge, through being so old when I entered the service, of what people have to contend against outside; and I am afraid that condition would be a bar, being liable to be called upon at any moment; a large mercantile concern would be entirely unhinged by that, and it would prove a serious drawback, I think, if any useful or responsible person were liable to be called away from his work at a moment's notice. Although it is only a matter of opinion, still I think that has something to do with the small number of engineers who have entered the naval reserve.

4806. We do not pay them?—Yes; but still a good many like the honour and glory. I may repeat that I am afraid that being liable to be called upon would be a serious bar. I would have myself (although I am willing to retire to make room for young men) to

seriously think the matter over if I had to go upon those terms, as it would so very seriously affect my position altogether.

4807. What course would you take to improve the flow of promotion?—By allowing engineers to retire, and by increasing the number of chief engineers. I think the retirement ought to be increased also.

4808. Is there any other point that you would suggest?—Yes; to reduce the number of entries of engineers.

4809. Do you think it would be good for the service to reduce the number of engineers and increase the number of engine-room artificers in each ship?—Yes, I do.

4810. Do you find the young engineers who now join the service good practical workmen?—I have found some of them to be so. I speak from my own experience.

4811. I mean those who have quite lately joined the service, the engineer students?—Yes; in the last three ships I have had some very good practical engineers from the students.

4812. Do you think, however, that if engine-room artificers took their place, that the repairs of the ship would be as well conducted and carried out?—Yes, under efficient supervision; that is, speaking from my experience of the engine-room artificers with whom I have had to deal.

4813. What trades would you recommend to be entered?—Chiefly engine fitters, a percentage of boilermakers, and, I suppose, a small number of copper-smiths or enginesmiths. I would like a distinction to be made between the ordinary blacksmith and an enginesmith. I have known very good men indeed, and men who have got into good positions, from being enginesmiths, but they have been, it is true, exceptionally good men, and not ordinary blacksmiths. The ordinary blacksmith is a man who can shoe a horse or repair a gate.

4814. Do you think then, that instead of making use of the term "smith," it should be specially "enginesmith"?—Yes, I think so.

4815. Is not a fitter an enginesmith to some extent?—Most engine-fitters can do a little smithwork, and ordinary repairs to the boilers.

4816. And a boilermaker, I suppose, would be a fair blacksmith?—Not necessarily, because "boilermaker" is a very comprehensive term.

4817. It is not only smith's work?—No, not only smith's work; a man may be taken out of a boiler shop, and his knowledge of boilermaking may be very limited so far as a smith's part of it is concerned.

4818. Do you think that the pay and position that are now given to engine-room artificers are such as to enable us to get good men?—I am afraid not; there are several matters that might be remedied.

4819. What would you suggest?—A better understanding as to what they have to do on board ship in the shape of cleaning their messes and scrubbing their hammocks, and I would also suggest that they should be relieved from the jurisdiction of the master-at-arms. I believe those are things of which they complain very much.

4820. Would you suggest any alteration with regard to the uniform?—They object to wearing a jacket, but I think myself that that and other complaints are rather sentimental grievances than otherwise. They would prefer having a frock-coat, the same as other chief petty officers have.

4821. As it is most important that we should obtain good men what pay would you suggest that we should give them?—If you give better pay you will get better men.

4822. From your experience of the men now in the service do you think it is difficult to get good men?—Of the thirty who have come under my notice they have been good men with one exception.

4823. What trade was that exception?—He entered as a boilermaker, but was found to be useless, and he was dismissed the service.

4824. What became of him?—I really cannot tell.

4825. Has your experience extended to men from the government factories as well as those from the private trade?—Yes, both.

4826. From where do we get the best workmen?—We can get very good men from both places, but a little more judicious selection would perhaps be better.

4827. Putting on one side an increase of pay on entry, do you think it would be wise to give them a progressive increase for length of service?—Certainly, because I have heard it stated that one of their grievances is that they are never improved.

4828. Do you think that they will re-enter after their 10 years shall have expired under the present regulations?—Yes, I think so.

4829. From your experience of engine-room artificers do you consider that it would be desirable to divide them into two classes, is it likely that we shall always have a better and a worse class?—I should hardly like to answer that question, because it would all depend on the way in which the classification was made. If it were left entirely to the superior officers it would throw open the door to favouritism. There might be other ways of meeting the difficulty, but I do not see my way clear to it.

4830. Should we not have the same means of ascertaining whether a man was fit for promotion amongst the engine-room artificers as we have now in all other classes?—Yes, quite so.

4831. In the "Triumph" who has charge of the double-bottom and sluice valves and cocks?—The chief engineer is responsible.

4832. Who does he appoint to look after them?—One of the engineers.

4833. Will you first mention his rank?—The particular one is the fourth engineer.

4834. The junior engineer?—Yes.

4835. Has he charge of all the double-bottoms and watertight compartments in the engine-room or boiler compartments right fore and aft the ship?—He has charge of the double-bottom right fore and aft the ship. In our particular case there is only one small piece of double-bottom extending beyond the engine-room, that officer has an assistant engineer assisting him in a part of that duty.

4836. Does that duty include the watertight doors and the compartments before and abaft the engine-room?—Yes, all watertight doors.

4837. And all the double-bottom?—Yes, and all the wings.

4838. Does that engineer keep watch as well?—Yes.

4839. Who has charge of the small auxiliary engines on board the ship?—The assistant engineer, who only keeps the two dog watches with me.

4840. How long has the assistant engineer been at sea?—He has not been at sea yet. He only came from college this term.

4841. What is his name?—Mr. Ellis.

4842. In the event of the number of engineers in the ship being reduced, how would you provide that the junior engineer in the ship should have learned the management of the engines before keeping a watch in a large ship?—I think he might have facilities for that during the time he is in the dockyard as a student. I think most of them have, and also some short probationary period in the reserve before going to sea; nearly all of them know something about the management of machinery through going on trial trips, and they see engines too when under their greatest strain at such times as that.

4843. Have you any suggestion to offer to the Committee, beyond what you have already mentioned with regard to the improvement of the position of the engineer officers in the service?—I think not. I will just recapitulate what I have said: an increase in the number of chief engineers on the active list, their employment in smaller ships; a scale of retirement for old engineers, to compensate them for their loss of promotion; a reduction in the list of engineers and a corresponding increase in the number of engine-room

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artificers; an increase of pay for both grades; an increase in the rate of retirement of engineers; and there is an open question which has not yet been touched upon, and that is, the accommodation on board ships. I think it would add much to the comfort of the engineers, if the engineers' mess were abolished.

4844. And, of course, the engineers put into the gun or ward-room messes, according to rank?—Yes, or according to their length of service.

4845. Are you aware that since the engineer students have been established, that the boys are taken from any class of society; it is thrown open to competition, and any one may offer himself without reference to social position?—I am aware of that.

4846. Are you aware of the class of men which enters?—Not exactly.

4847. Just look at that list (*handing the same to the witness*). Do not you think that that in itself is a bar at present against admitting them directly into the gun and ward-room messes?—Yes, I quite see the difficulty. I would not propose at all that the alteration in messing, should be made at once.

4848. Do you think that it would be desirable, for the benefit of the service in every way, that the candidates should be nominated by the Board of Admiralty, instead of being allowed to enter from any source, whatever it may be?—Certainly.

4849. Have you any sons?—No, I am not married.

4850. Have you any other suggestions to offer to the Committee, as regards the engine-room artificers? I think not, if it was quite understood, that I think it would be advisable to place a check upon their indiscriminate entry. I think that there should be some selection. I think at present they may be copper-smiths, blacksmiths or fitters; the greater number, I think, should be engine-fitters, with a few of the others to meet emergencies.

4851. Do you think that the smiths should be limited to engine-smiths?—Yes, I think so.

4852. Do you think that the ship's blacksmith could do any forge work ordinarily required for the engines or boilers?—Yes, I have seen some very good ships' blacksmiths indeed, but they were exceptional men; if one could be sure of getting men of equal ability, they would make very good engine-room artificers indeed.

4853. So long as you have good blacksmiths in the ship, as you may have amongst the stokers, you would rather exclude them from the rating of engine-room artificers?—Oh! yes.

4854. (*Captain Dowell.*) Have you thought at all what pay it would be advisable to offer the engine-room artificers on first entry?—I would hardly like to say.

4855. Do you know what it is now?—Yes, 5s. on entry, and 5s. 9d. after three years, but when one takes into consideration that these men have to devote all their time to their work, and drawing a comparison between the pay they get and that which a good workman will receive on shore, it appears to me that the wages are low, although I should not like to fix what the amount should be.

4856. Do not the engine-room artificers of the "Triumph" frequently work on board other vessels of the squadron?—I do not know about "frequently," but they are called upon at times, and the engineers are also sometimes.

4857. On those occasions they receive extra pay, do they not?—Yes.

4858. (*The Chairman.*) How much do they receive?—I do not know what the rate is.

4859. (*Mr Covey.*) It is 3s. 6d. a-day.

4860. (*Captain Dowell.*) Do not you consider that the extra day's pay, namely, for seven days instead of six, is an inducement for men to enter the service?—I am afraid not, they do not stop, or are not of a class to reckon up the seven days a week, but even if they did, 35s. a-week would only be about the fair wage of a skilled mechanic in the market, who has every

night at home, and is not liable to be sent abroad for three or four years away from his family. Again, even if the engine-room artificer be employed at a home port, he would have the liability of being obliged every night to sleep on board some ship.

4861. In a home port they receive an extra 1s. 1d. a-day?—I am giving them every credit for the value of the rations which is in addition to their pay, and also for what I suppose they would actually value their pension at, but still I think the pay is hardly sufficient to go into the market with, and get as good a class of men as it would be for the benefit of the service to obtain.

4862. What pension in your opinion could a man justly expect to receive at the end of twenty years' service?—I think they are satisfied with the pension. I have not heard any complaints of the present rate, which is, say £1 a-week.

4863. (*The Chairman.*) I suppose they do not think much about the pension on first entry?—No, I think not.

4864. (*Captain Dowell.*) Supposing the number of engineers was reduced in each ship, and the number of engine-room artificers increased as you suggest, what complement would you propose for a ship like the "Triumph"?—Two chief engineers, one to do the duty connected specially with the propelling force, and the other to have full charge of all the work outside the engine-room, there is so much work there, the capstan engine, steering engine, 40-horse engine, ash engine, and all the sliding doors, water-tight doors, and sluice valves, and so on. I think that another chief engineer might be very well employed, to look after those things only.

4865. Under those circumstances do not you think it would be necessary to have two different sets of stokers—in fact, two engine-room crews—would they not clash?—Not if the duties were properly defined—if one had a grade of rank higher than the other, it might be as well, but let the duties be thoroughly defined. I know the arrangement fell through before; I was shipmates with it, and I know where the blot was; it was because the duties were not thoroughly defined, and one gave the other directions to perform the duty of the second engineer of the ship, upon which he said, "I have come up to my time and have served so many years, and thought I was free of that sort of thing, that is engineers' work."

4866. Would it not be like putting officers in two launches, one with a crew and the other without, the one boat's crew to work for both?—I do not think there should be any difficulty in arranging the work. I think it might be arranged for two chief engineers, three engineers for watch keeping, and six engine-room artificers. I really think that our ship would bear another officer in the department with benefit to the service.

4867. (*The Chairman.*) The superintending responsibility might be under the chief engineer, you think?—Yes, if you give the engineer a better position in ship the thing would work. We want an officer in charge of that department, i.e., the watertight door and double-bottom department, that has a better standing in the ship than the engineer at present has.

4868. With regard to whom?—With regard to the ship's company, and other affairs of the ship.

4869. (*Captain Dowell.*) The engineer now ranks with an assistant surgeon?—Yes; but still that rank exists more upon paper than anywhere else. I do not wish to enter into any vexed question of that sort, because it would not, perhaps, be of any practical benefit. I speak in a service point of view, and I think it would be to the benefit of the service if the officer who has charge of all the work round the deck, which would naturally bring him in contact with the ship's company, were an officer of some standing, in order that he might be treated with respect and deference while engaged in the performance of his duty about the ship.

4870. Are the engineers satisfied with their pay?—No. There should be an increase.

4871. What increase would you expect?—That would all depend. If provision were made for promotion at an earlier age, of course, that would meet the difficulty. Here am I, a man of 44 years of age; and, supposing I had entered the service four years younger than I did, I now would be 40 years of age, yet I am now receiving £180 a-year. I take credit for rations and the prospect of the pension, but one does not work until 50 years of age to retire upon a pension of £100 a-year. I think that I ought, after a long and active career, and having been a steady man and not quite an idiot, to have something better to look forward to than simply bread and cheese. Just let me take when I entered the service, and, say, compare it with the three years 1857, 1858, 1859 (then the government went into the market for engineers), supposing you went into the labour market now, and wanted 500 skilled men, whatever they may be, whose wages average 36s. a-week, and offered them 6s. a-day, and at the end of 20 years, after having been exposed to all the dangers of a sea life, Yellow Jack, the Naval Discipline Act, separation from home and family—for all that they were to receive £180 a-year, after having worked for 20 years in the public service—I think that if you went into London, and bid in the London market for those men, you would find a difficulty in getting people to take the berth; it would be looked upon as a poor thing, and we should not get such efficient men as the government ought to be able to command.

4872. (*The Chairman.*) Even, although at the end of that time they can retire upon £100 a-year?—Yes; but that is too late, if I had been allowed to retire three years ago, I could have put my services into the market, now I cannot go until I am 50, and I cannot put myself into the market then.

4873. When you entered the service, when did you expect to be made a chief engineer?—In about 10 years. I judged of that from what I had seen of other persons whom I had known join the service.

4874. (*Captain Dowell.*) If you had been promoted at the end of 10 years, you would have considered your position satisfactory?—I should have been quite satisfied, because then I should have considered that the bargain was kept.

4875. (*The Chairman.*) If you were now offered retirement at your present regulation retirement, or promotion to the rank of chief engineer immediately, which would you take?—I have a strong opinion upon that, but I am afraid I might prejudice my own case if I stated it. I should not hesitate in going at once. I should be pleased to retire, as I am, perhaps, getting rather too old for promotion.

4876. (*Captain Dowell.*) Even supposing you were allowed to count your junior time?—Yes, under any circumstances, and I will tell you my reason for that. I have now got up to a certain age, that it would be no pleasure or comfort to me to have to join as a junior chief engineer. I should have twelve months' half-pay to begin with, and then, when getting on for 45 years of age, to have, as junior chief engineer, to join a small ship, where there was a mess of young men whose habits would be different from mine, I should be no company for them, and they would be no company for me, and the consequence is, I would rather take myself off and bury my disappointments somewhere else. Mine is a peculiar case, because I have not got that pull upon me that other officers have in having a family, and thereby perhaps being compelled to serve on.

4877. Do you think that if the gun-room and ward-room messes were now thrown open to the engineers, that a great many of them would object to the expense of those messes?—I do, but you must remember that I also asked for an increase of pay.

4878. Upon what pay do you think they should commence?—They now get 6s. a-day; I think juniors might commence upon 7s. a-day, and it should be progressive of course. Our present progression stops

altogether after twelve years' service, unless promotion comes in. If I go on serving for the next six or seven years I shall get no increase of pay. After four years I got a slight increase, then after another three years I got another increase, and after being twelve years in the service I got an increase of 1s. a-day, that was my last step, after that I got no more increase, there I stopped.

4879. (*Mr. Wright.*) Have you four years time as second assistant?—Yes; that regulation regarding promotion at the end of three years was not in force when I came.

4880. (*Captain Dowell.*) You lost a years' time by that?—Yes; I also obtained Dr. Woolley's certificate, which, if I had got in the grade below, I should have the benefit of; now it is no benefit to me at all, it puts me to the 15th of July, 1864, and there are so many before me that I cannot expect to be promoted at all.

4881. (*Captain Commerell.*) At what age should you think, for the benefit and efficiency of the service, an engineer should be promoted to the rank of chief?—Not after 40, and not before 32; somewhere between those two ages.

4882. What age should you consider the most efficient?—I would say 35; at that time a man is in the prime of life, and has acquired experience.

4883. Taking into consideration that the age for an engineer to be made chief was 35, do you think that your branch of the service would be satisfied if their pay were assimilated as nearly as possible to the pay of other officers of relative rank in the service?—I hardly am well acquainted enough with the subject to be able to say; my own case has been so hopeless a one that I have not looked so far ahead as that. I think that there would be a great feeling of satisfaction, and it would be a great improvement upon the present condition of things, and would enable an officer to get in his eleven years, which, under the present circumstances, we cannot possibly do. The engineers seem to think it a great hardship that so many years should be entirely lost to them; the early part of their life being thrown away.

4884. Do you think the feeling is universal amongst the engineers that the engineers' mess should be done away with?—No, it is not universal; there is a great majority in favour of it. I think that all the better men are in favour of doing away with it, provided you give them something to meet the extra expense. When a man is from 36 to 40 years of age, that is the time when his expenses are about the heaviest in his life; if he be a family man, it is as much as ever he can do to keep up a respectable position on his pay of £180 a-year, and also to meet his expenses on board ship; therefore, they are not prepared to meet any extra expense in the way of messing, unless some increase in remuneration shall be given to them.

4885. You are aware, no doubt, that there are more young engineers married men than in any other class in the service?—Yes, I am aware of that.

4886. Can you give any reason for that?—It is simply their own folly; young officers, such as assistant paymasters and others of their own age, have not the same opportunities of getting spooney and then married. Take the case of sub-lieutenants and assistant paymasters, they are not exposed to the same temptations and have not the opportunities for forming connections, making acquaintances, and getting married in fact, that the students have.

4887. Do you think that the education and practical training which the engineer students receive during their time in the dockyard fits them for being, immediately they come into the service, put into the gun-room?—I think so. I know a little of the gun-room messes, of course, from my experience at sea, and I see no reason why they should not be under as perfect control there as in the engineers' mess at the college; and I saw nothing during my time at the college in the engineers' mess that was not quite as good as in any gun-room mess at sea; it was as well conducted and orderly, and the discipline, naval or social, was as

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good at that table or in that mess as ever you will find it in any gun-room mess, I am sure.

4888. You have seen the source from which many of the engineer students come?—Yes.

4889. Are you aware that during their six years' training in the dockyard, those young men go every night to their homes, and are daily and hourly mixing with a class which would be utterly strange to the gun-room officers; do you think that those two mixtures would amalgamate well?—I do not. I think it is a change which should not be made at once; some little time should be taken about it; but still I cannot forget the way in which they messed at the college; the mess was composed principally of young students, and I saw nothing, and knew of nothing, that would be at all objectionable in any gun-room mess. Of course it is quite open to the other members of the mess, the young officers who come from a higher social position, to form their own friendships and attachments, and I know that, without being put into a mess together (I am now speaking of 15 or 16 years ago), warm attachments sprang up between members of the engineers and gun-room messes, and the young gentlemen would spend hours in the engineers' mess, and *vice versa*, but I do not know of any evil results arising from the social intercourse between them. If you had an objectionable character in any mess he would find his own mark, and he would be pretty well scouted; and if he does not assimilate himself to the better position in which he finds himself, and pay a proper regard to the rules, he will be made so very uncomfortable that he will be glad to get out of it.

4890. You are aware, I suppose, of the very strong *esprit de corps* which has sprung up amongst the young engineers, to make themselves worthy of the gun and ward-room messes?—Yes; very strong indeed.

4891. Do you think it is desirable to make the engine-room artificers warrant officers?—A warrant officer being a quarter-deck officer; I do not think it would do.

4892. You think that it would very likely interfere with his practical working?—Yes, it would.

4893. The warrant officer not himself putting his hand to any work, an engine-room artificer messing with him and ranking with him would very likely follow in the same groove?—Yes; the tendency would be that way.

4894. Do you think that the engine-room artificer has very reasonable grounds for being annoyed by the discipline to which he is subject on board ship, or do you think it arises from the artificers of the first class coming new into the service, and not understanding the ways of it the same as men who have been brought up in it?—Yes; there may be a little of both. I can quite understand it; it did not occur to me before you suggested it just now, but I can quite understand that the novelty of the thing would be part of the objection, though I think that the other is the chief objection.

4895. Where do you think that their complaint generally lies; is it that the master-at-arms on his own account bullies them?—Yes.

4896. (*Captain Dowell*.) Bullies them purposely, do you think?—Yes, I really do. There is a great deal of jealousy amongst these people; but I suppose in all cases there is.

4897. (*Captain Commerell*.) From your own experience of the various masters-at-arms that you have seen, have you observed that the master-at-arms attempts to override the chief petty officers generally, both executive and civil?—I do not think they would attempt it with the executive chief petty officers, but I think they do with the civil ones.

4898. (*The Chairman*.) The ship's steward?—It would not be policy to fall out with him; *their* case is of a peculiar nature; they would not attempt it perhaps with the schoolmaster, or the writer, because those men are to a very great extent independent of him; the writer could go and complain to the paymaster, who would take up his cause and would have

a certain amount of interest in him, and the schoolmaster would complain to the chaplain, who would perhaps take up his cause, but the engine-room artificers are alone; true, they can go to the chief engineer, but it takes him all his time to fight his own battles.

4899. (*Captain Commerell*.) Would you recommend that the engine-room artificers, where practicable, should mess by themselves and be, as far as discipline would allow, under the more immediate control of the chief engineer?—I am hardly competent to judge of that.

4900. (*The Chairman*.) Even his mess place to be under the control of the chief engineer?—No, I would not suggest that the chief engineer should have anything to do with the messing.

4901. (*Captain Commerell*.) Under whose control would you place the mess place of the engine-room artificers?—Generally, there is a mate of the lower deck.

4902. In many ships the master-at-arms is the mate of the lower deck?—Yes; and in such case let them be responsible to the commanding officer, they are directly under him at present; they have in most ships to get leave from him; that is the general rule, I believe.

4903. You are aware that the commanding officer holds the mate of the lower deck or the master-at-arms responsible for the cleanliness of the lower deck?—Yes.

4904. How can you manage that there should be a mess on it, entirely independent of any control, it would be a sort of Monaco in the middle of Italy?—One of the petty officers would have to be directly responsible to the commanding officer for the cleanliness of the place; is not the serjeant of marines responsible for the cleanliness of the mess to which he belongs? I speak of ships like the "Liffey." I think that the engine-room artificers' mess might be under the senior man of the engine-room artificers, and under the inspection of the officer who goes the rounds.

4905. Where do they mess in the "Triumph"?—On the flat, with the bandsmen and stokers; the stokers at one side of the flat, and on the opposite side the bandsmen and chief petty officers.

4906. (*The Chairman*.) Which flat is it?—The boiler-room flat.

4907. (*Captain Commerell*.) The chief petty officers have a separate mess to themselves?—Yes, with the exception of the ship steward, writer, master-at-arms, and schoolmaster.

4908. They mess separate?—Yes.

4909. Have you heard any complaint on board the "Triumph" about the mess place of the engine-room artificers?—I never listen to them, but I believe there is some little dissatisfaction.

4910. (*Mr. Covey*.) I think you said that you would recommend that one chief engineer should look after the water-tight doors, with an assistant in the shape of a leading stoker mechanic, and one or two men, as the case required?—Yes.

4911. (*The Chairman*.) For his staff?—Yes.

4912. (*Mr. Covey*.) Do you think that would be sufficient?—He would have to get assistance, if necessary.

4913. Would you like to take his position if you were a chief engineer?—Sooner than not be promoted at all, yes.

4914. You said that you would have two chief engineers and three engineers in a ship like the "Triumph," but you have not provided in any way for the event of one falling sick; would you give an engine-room artificer charge of the watch?—They would have to do that.

4915. Do you think they would be qualified to take watch in a ship of that size in the channel squadron?—I think so, if we obtain a better class of men.

4916. How far would you allow an engine-room artificer to take charge of the watch?—Never, if there were an officer to do it, but when the staff is

limited, we are obliged to fall back upon the next best man. I suppose there have been times when gunners' mates have had to keep watch on the quarter-deck of small ships.

4917. I speak of a ship like the "Triumph" in the channel squadron, when performing steam tactics and all that sort of thing?—You must increase the staff to meet contingencies. I put that number down as the minimum number.

4918. You spoke of the engineer students, and you said that you thought they ought to have more experience in the reserve, could you give any idea as to how you would enable them to gain that experience before sending them to sea?—They would have to go on every trial trip. I do not know whether the

government would think it worth while to place a steam vessel at their disposal, in order that they might learn the working of machinery, but I think it is possible that it might pay.

4919. Do not you think it would be well, if, for six months they were attached to a ship, not as part of the complement, but to gain experience?—Yes, it would be very much better than keeping them in the reserve.

4920. (*The Chairman.*) Do you think that an engine-room artificer who has been in charge of the engines of a small vessel would, on an emergency, be as capable of taking charge of the engines of the "Triumph" as an engineer student just out of his time?—I do.

(*The witness withdrew.*)

LINGHAM ENNIS, Engine-room Artificer, called and examined.

4921. (*The Chairman.*) Where are you now serving?—In the "Waterwitch."

4922. What is your trade?—An engine-fitter.

4923. Where did you learn your trade?—At a commercial foundry in St. Helier's, Jersey.

4924. Are you a Jersey man?—I am.

4925. Was it a brass or iron foundry?—It was called a foundry, but it was a machine shop; they had both a brass and an iron foundry there.

4926. What work did they do?—Generally fitting work.

4927. For marine engines?—Yes, and stationary engines.

4928. How long were you there?—For seven years.

4929. Was your work while learning your trade that of a fitter entirely?—Yes, an engine-fitter entirely.

4930. Did you do any smith's work?—No.

4931. Not even a spell of smith's work at the forge?—Yes, I have gone so far as to repair a chisel, or temper a drill.

4932. While learning your trade did you pay anything for your apprenticeship?—No, I did not, as my father was the proprietor of the establishment.

4933. Is it usual to pay a sum for entry as apprentice?—Yes, it is.

4934. About what is the sum?—About £100. From £50 to £100 in Jersey.

4935. Did you join the navy immediately on coming out of your time?—No; I worked as a journeyman at several places.

4936. Where?—At Sharpe's and Company, Manchester, and the Falcon Works, Manchester, also.

4937. For how long?—About a year and nine months.

4938. Between the time of completing your time and joining the navy?—Yes.

4939. When did you join the navy?—In the middle of 1870.

4940. Were you actually in employ when you came into the navy?—No; I was out of employment.

4941. Had you been at sea before?—No; I had never been to sea before.

4942. Had you a fancy for a sea life, or did you come to it because you found it was the best opening?—That was my reason at the time.

4943. Are you a married man?—Yes.

4944. What was your first ship?—The "Audacious."

4945. And after that?—The "Vanguard."

4946. And then?—The "Triumph."

4947. How long have you been in the "Triumph"?—Two years last March.

4948. How do you stand amongst the engine-room artificers on board, as regards seniority?—I am the senior.

4949. What duty do you do at sea, do you keep watch in the stokehold?—No, we have four engine-room artificers, and being the senior engine-room

artificer, I do a day's duty at anything; when the engineer is out of the way, I attend to the auxiliary engines.

4950. Have you had charge of the engines at sea?—Yes, in the "Triumph."

4951. Under what circumstances?—When we captured some Spanish ships round Carthagena, several engineers were out of the ship, and there was not sufficient to keep watch, and I had to keep a watch in the engine-room.

4952. How do you like the service?—I like it very well, if our position was made a little more comfortable.

4953. What improvement would you suggest in it?—More comfort generally, a better defined position, and some little better pay than we now have.

4954. By "defined position" do you mean as regards your mess place?—Our messing and comfort in general.

4955. Just mention in what way you think that your comfort could be improved?—By having a mess to ourselves, and being entirely relieved from all menial duties, such as being called upon to clean the mess, or scrub the hammocks, or anything of that sort; a little privacy, so that if a man were given to study a little he might have an opportunity of doing so.

4956. You have never been accustomed, all your life, to that sort of work, such as scrubbing out a mess place?—Only since I have been in the service.

4957. But before that?—No.

4958. It was quite new to you?—Yes. I never did it before. I had never been to sea before.

4959. Now, from the experience which you have had at sea, do you think that you might be excused from cleaning your mess-place in view of the ordinary regulations of a ship of war; does it strike you that there is any objection to your being excused from cleaning your mess place?—At present, holding the rank that we do, we are obliged to clean it, because other chief petty officers, who are holding a rank slightly superior to ours, do the same thing, and we cannot be excused from doing it on that plea.

4960. Where do you mess in the "Triumph"?—We have been messing on the broadside in one of the flats; the commander has built us a separate mess for the engine-room artificers and other chief petty officers.

4961. Does that include the executive chief petty officers?—Yes.

4962. How many are in it?—Six.

4963. Have you any boy to wait upon you?—Yes.

4964. Who cleans the mess?—We take it in turns every morning.

4965. Could a boy do that without your help?—I think so.

4966. If that were the case the question of cleaning your mess out would be settled?—Yes.

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4967. Does the master-at-arms inspect your mess place?—Yes, he has done so.

4968. Is it his duty at this moment?—Yes.

4969. Who messes on the flat with you?—The carpenter, stokers, petty officers, idlers, blacksmiths, and captains of the hold.

4970. Do you belong to a trades union?—No.

4971. Have you ever?—No.

4972. Do they work in Jersey much?—There are no trades unions in Jersey.

4973. You say you ought to have better pay, what would you suggest as sufficient pay to induce good men to remain in the service?—A rise equivalent to what an ordinary journeyman might expect to receive upon shore.

4974. About what would that be?—After he has been some time in employ, his services become valuable to a private employer even, and it must be the case in the service; if our pay rose from 5s. to 7s. a-day after so many years' service, I think it would be satisfactory.

4975. What number of years' service would you say?—I would say ten years' service.

4976. Should you be inclined to remain in the service at the end of ten years with that pay?—Yes, I should.

4977. What pay with your trade could you get on shore?—From 6s. to 7s. a-day.

4978. That is for six days in the week?—Yes.

4979. In the service you get your provisions, are paid for seven days in the week, and have the prospect of a pension?—Yes.

4980. Have you ever worked for other ships?—Yes.

4981. What pay did you get then?—I had 3s. a-day extra.

4982. In addition to your ordinary pay?—Yes.

4983. Have you ever been in the steam reserve?—Yes.

4984. Waiting appointment?—Yes.

4985. Supposing the engine-room artificers had two or three years in the steam reserve after they had been a few years at sea, do you think they would consider it a great boon?—Yes.

4986. Have you ever been shipmates with other engine-room artificers than those you are now with?—No, not in other ships; in my two former ships I was the only engine-room artificer, in the "Vanguard" and the "Audacious."

4987. Were they in the reserve?—Yes.

4988. How do you like the uniform you wear?—I like it very well except the short jacket; I think if we had a coat it would be better, for a big man to wear a jacket in all weathers is not comfortable.

4989. What dress do you wear when working?—A serge dress.

4990. Your own private kit?—Yes.

4991. Is that the nicest working dress you can wear?—Yes, I think so.

4992. Have you ever worn any other?—No, never.

4993. What dress did you wear when working at your trade on shore?—I had a French serge, a sort of brown stuff.

4994. Beyond what you have already mentioned, do you think there is any other point in which the position of the engine-room artificers might be improved?—Yes, there is one other thing, and that is that originally, when we first entered the service, we had a chest allowed us which was 3 feet 4 inches long by 2 feet square; that has been reduced to 3 feet long by 18 inches square, outside dimensions, and it is not sufficiently large to hold the amount of clothes that we are obliged to take to sea with us.

4995. Have you not a locker in addition to that?—Yes, in the bath-room, to keep the soap and towel in.

4996. Not any in the mess place?—No.

4997. Not any in the new place given you now to mess in?—No.

4998. After you have done your work where do you wash?—In the stokers' bath-room.

4999. Have you found any trouble about that?—Yes.

5000. What is the trouble?—Very often the stokers are very dirty in their habits, and so on, and we have to wash in the same basin as they wash in.

5001. (*Captain Dowell.*) What pension do you expect to get at the end of 20 years' service?—It is a thing that I scarcely understand, but I believe that our scale of pension is similar to that of other chief petty officers; about £52 a-year, if we have served for 20 years.

5002. Do you consider that a good pension?—I hardly consider it is a pension in proportion to our pay.

5003. What do you think it should be in proportion to your pay?—A pension of say about 3d. a-day for every year that we served.

5004. That would be very nearly equal to your pay?—Would it? I said that at haphazard.

5005. Your pension is the same as that of other chief petty officers, but there is not one chief petty officer in twenty, amongst the seamen, that ever obtains his full pension. You enter as a chief petty officer, and therefore count the whole of your time as such, whereas a seaman chief petty officer may, perhaps, be only able to count ten years?—Quite so.

5006. Where do you muster on board the "Triumph"?—On the flying deck.

5007. With the stokers?—On the same deck, but on the opposite side.

5008. (*The Chairman.*) Who musters you?—We are not mustered individually; we merely fall in.

5009. (*Captain Dowell.*) Who takes charge of your hammock?—I have a hammock-man.

5010. What do you pay him?—5s. a-month.

5011. (*The Chairman.*) What does he do for that?—He brings my hammock down every evening and takes it up every morning, and scrubs it.

5012. (*Captain Dowell.*) Does he wash your clothes?—No, he is not recognised.

5013. When you want to go on shore on leave what process do you have to go through?—It varies in different ships. In the "Triumph" I have to ask the senior or chief engineer for leave, and then I ask the commander.

5014. You personally do that?—Yes.

5015. Have you any dealings with the master-at-arms?—Not in the "Triumph."

5016. (*The Chairman.*) Have you had in other ships?—Yes; I have been in other ships where I was compelled to go and ask the master-at-arms for leave, or request him to ask the commander for me, and very often he has refused to do so.

5017. (*Captain Dowell.*) When you return to the "Triumph" do you report yourself to anybody?—Yes; to the officer of the watch, or the commander.

5018. (*Captain Commerell.*) When you entered the service, was it for the sake of the daily pay, or the hope of the pension. Which was the greater inducement of the two for you to enter?—When I entered the service I did not know exactly what the service was. I was out of employment at the time, and I was told that it was a good opening for a young man. I had an idea when I entered that there was some chance of rising to a better position, and the pay being somewhat equal to that of me on shore, I thought that after a few years I might get on better and better; however, I found when once I had joined that there was no hope of rising.

5019. Therefore you looked forward to the pension as your reward?—Yes; in some shape, but we want something that we can enjoy at present, something that will make our life a little more happy and comfortable.

5020. Which, you think, would be the case if your messing arrangements were altered, and other small grievances dispersed?—Yes; I am confident we should, and it would induce other good men to join the service.

5021. Have you had much experience of the smith artificers in the service; not the enginesmiths, but

the ordinary smith artificers; blacksmiths, but not the blacksmith of the ship?—I do not think any enter the service except enginesmiths. I have never seen any.

5022. Are they up to heavy forging?—Yes, and light work also; I have seen them do light work on board.

5023. Would you prefer, supposing you had your choice, to mess with the executive chief petty officers, as you do now, the master-at-arms and ship's steward, or to mess by yourselves?—I would prefer messing by ourselves.

5024. Supposing that in a ship there was not a sufficient number, or sufficient accommodation, where would you like to mess then?—I would rather mess with those of the same cloth as myself.

5025. (*The Chairman.*) With the civil chief petty officers?—Yes.

5026. (*Captain Commerell.*) Have you found any jealousy existing between the engine-room artificers and the executive chief petty officers?—Yes, I have known such things occur; they have been jealous because the engine-room artificer comes into the service as a chief petty officer, and as a rule gets better pay than most of the others; they have not taken all things into consideration. I have known such cases, but I have not noticed it during the last year or two.

5027. Has not that arisen from the engine-room artificer being the only one in the mess who has considered it rather derogatory to clean the mess out?—It might have been somewhat in consequence of that; I know a great deal of ill feeling exists through that cause, from the engine-room artificers refusing to do it.

(*The witness withdrew.*)

HENRY WALLACE ELGAR, Esq., R.N., called and examined.

5034. (*The Chairman.*) What is your standing?—The 11th of February, 1862.

5035. In what ship are you now serving?—In the "Agincourt."

5036. As chief engineer?—Yes.

5037. How long have you been in her?—Twelve months.

5038. What staff of engineers and engine-room artificers have you?—Seven engineers and three engine-room artificers.

5039. Is that the complement of the ship?—Yes; that is the complement of the ship.

5040. Of what trades are the engine-room artificers?—Two fitters and one boilermaker.

5041. Do the engine-room artificers keep watch?—In the stokehold.

5042. All of them?—Yes.

5043. What ship were you in before?—The "Rattlesnake."

5044. What engine-room artificers had you there?—There was one allowed in the complement, but we had three during the commission.

5045. What trades were they?—Fitters and turners.

5046. When you want blacksmith's work done in the "Agincourt," how do you manage?—The stoker-mechanic does it principally; the boilermaker does his own smith's work.

5047. What is your pay as chief engineer?—17s. a-day.

5048. When shall you be able to retire?—In six and a-half years more, that is optional.

5049. How old are you?—43.

5050. How old were you when you were made chief engineer?—Not 30.

5051. Were you promoted before your time, or by seniority?—I was promoted for my services in China, I was the senior on the station in 1860, I was there from 1857 to 1861.

5028. You think that if that matter were settled, and it was made the same in all ships, that the jealousy would entirely die away?—I thoroughly believe it would.

5029. Have you ever had any ambition or desire to become warrant officers?—I have heard some of my brother engine-room artificers state that they would like to, but I have one objection to it, and that is to serve the great length of time that a warrant officer has to serve, otherwise I would be very glad to hold a position equal to that of a warrant officer.

5030. (*Captain Dowell.*) That is to say, if you could have the advantages without the disadvantages?—Yes.

5031. (*Captain Commerell.*) Are you aware that there would be one great difficulty in the way of engine-room artificers becoming warrant officers, namely, that they are entered as, and must remain, men who work with their hands, and that warrant officers are men who have ceased to do so?—It never struck me in that light.

5032. Do you consider that if we gave the engine-room artificers the pay which you propose, and £52 a-year pension, that we should get a very fair average class of engine-fitters to enter as engine-room artificers, not only from the dockyard but also from the private trade?—Yes, I think you would, that is, if the mess accommodation was better also. I am confident that would be an inducement for men to enter.

5033. You think it is a question of a small progressive increase of pay, and an alteration in the messing arrangements, that would induce them to come in more than any thing else?—I am certain of it.

5052. (*Captain Dowell.*) In what ship?—In the "Staunch" gunboat.

5053. (*The Chairman.*) Were you promoted before your time for seniority?—Yes. Previous to leaving China I was promised one of the war commissions; but having left China before they were issued, when I went up to pass before Mr. Lloyd at the Admiralty he informed me it was placed against my name that I was to be promoted directly. I had passed for service in China, I passed on one day, and was promoted the next, or two days after.

5054. For the good of the service, at what age do you think a man should be promoted to the rank of chief engineer?—At the age of 32, and not to exceed 35 years of age, so as to give him an opportunity of receiving the higher rates of pay.

5055. Do you think that for the benefit of the service, the promotion in the engineer branch is satisfactory now?—No, decidedly unsatisfactory.

5056. How would you improve it?—By gradually reducing the number of engineers, and increasing the number of engine-room artificers to take their place.

5057. How would you reduce the number?—In proportion to the number in the ships, as you could get skilled artificers to take their place. These men you wish to get rid of are men of skill and of many years' experience, still they are men who are dissatisfied, for they have looked for promotion which they have not obtained.

5058. In what way would you reduce the number of engineers?—By giving them some inducement to retire, good retirement, say at least 6d. a-day for each year served. I think if their retirement came up to 9s. a-day, that they would only be too willing to go, if allowed to do so. I feel satisfied of that, and I do not see why the junior time should be deducted from them at all.

5059. It is not deducted from the engineers?—No, quite so.

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5060. What scale of pension to retire would induce chief engineers to leave?—I think that the present rates are quite good enough if the higher scales could be attained, and there are many now that if allowed would go.

5061. On the understanding that their junior time should count?—Yes, all of it.

5062. What complement of engineer and engine-room artificers should you think would be satisfactory for the "Agincourt"?—One chief engineer, four engineers, and six or seven engine-room artificers.

5063. Making the total number about the same as now?—Yes, about the same, or one engine-room artificer in addition.

5064. Do you find any disinclination on the part of the young engineers to work upon the repairs of engines, or is there a growing disinclination?—No disinclination particularly, so much as with the seniors. I think the juniors are not, except in very few instances, able to perform the work, they do not show their disinclination, although there is one, no doubt.

5065. Which do you consider the better workman of the two, a young engineer or an average engine-room artificer?—An average engine-room artificer. I think that a young engineer's qualifications are too theoretical. If it were imperative that they should pass, or obtain a desired number of marks in practical as well as theoretical knowledge, then they would know and feel that they must acquire a practical as well as a theoretical knowledge; but at present their sole aim is theory, and the practical experience in most instances is lost sight of entirely. There are exceptions, however; I have had engineers with me who had been students, and who have been very good practical engineers indeed.

5066. Are they not all examined as to their practical qualifications before they can enter the service?—There is certainly a practical test, but it is not, in my opinion, sufficient. It ought to carry numbers with it, the same as the theoretical test.

5067. Do not you think that there would be great difficulty in awarding marks at the different dockyards?—I do not know that there would be.

5068. Do you think that you might have a differential scale of five gradations, perhaps, would not that be better than giving marks?—I think marks would be the best test. There should be a moderate piece of work given to them, and their qualifications in doing it should pass them; marks should be given for the work.

5069. Do you consider that there should always be a highly-educated body of engineer officers on board ship with the engine-room artificers, whatever number of engine-room artificers there may be?—Yes.

5070. Do you think it is possible, if engineer students have to serve the same time to their trade as an engine-room artificer, but in addition to their practical work have to make progress in their theoretical education, they can be as good practical workmen as engine-room artificers?—Yes, if he is made to understand it, and it was made one of the requirements before a student could pass into the service.

5071. That is supposing that out of the whole of his six years' time he has to give two years to his theoretical education?—Yes.

5072. Do you think that in that other four years he could become as good a workman as an engine-room artificer could in six years?—I believe he could if he were placed in the way. I would suggest that the students should be so placed; that is, with a good practical man, or two or three students with each man to superintend them, and instead of having the first three years at the pay they get now, they had a reduced pay, and that the practical men were remunerated for the instruction to be given them; they have now a certain amount of instruction but they have no one to overlook them, as would be the case if they were placed under some one for the purpose.

5073. Are you aware that new regulations on that

head were issued about two years ago?—No, I was not aware of that.

5074. In May, 1873?—I have not seen them.

5075. That carries out your suggestion to a great extent; there is a leading man appointed to specially instruct engineer students, and their examination, instead of being conducted by the officers who instruct them, is conducted by the officers of the Steam Reserve; is not that likely to make good workmen of them?—I should think so; but a leading man might have thirty or forty students to instruct, and he could not give all his attention to them, and they would not receive the attention that they would get if one, two, three, or four of them as the case might be, were placed with practical men.

5076. You think more men should be appointed to look after them?—Yes; I do not say leading men, but practical men, it was done so in the early days when they were called engineer boys in the factory; the engineer boys were placed with a practical man, and were under his immediate supervision, and they knew that their examinations were not theoretical only, but were both practical and theoretical examinations.

5077. Do you think that the practical examinations, as now conducted by the officers of the steam reserve is stricter than it used to be?—I am not prepared to say whether it is or not.

5078. Are you aware at all of how long the practical examination lasts?—I am not.

5079. Supposing the number of engineers is reduced largely, as you suggest, and the number of engine-room artificers increased to do the principal part of the repairs on board ship, would you wish to see the theoretical examination of the engineers lowered?—The standard should remain the same.

5080. Do you think that the present regulations as regards engine-room artificers enable us to get good men?—I think if the pay were slightly raised and made progressive, and better retirements allowed, that we could get men from the outside as well as from the dockyards.

5081. From where do the men now chiefly come?—Principally from the factories, but some of them have come from the outside; those who have served with me have come from the factories; their practical experience has been obtained outside, but they worked in the factories.

5082. What pay would you give them on entry?—5s. a-day, and after 10 years' service 7s. 6d. a-day.

5083. And what pension?—3d. a-day for each year served.

5084. Do you think that the pension is a great inducement for the men to enter the service?—More pay would be a greater inducement, but they also think of the pension.

5085. Do you think that the pension is a great inducement for the men to remain in the service?—Yes, decidedly.

5086. Have you heard any complaints of the treatment of the engine-room artificer in the service?—Yes.

5087. What are they?—The principal thing is having to do the menial work of the mess, cleaning the mess out and scrubbing the hammocks; and also I think they would prefer being more immediately under the control of the chief engineer, and of the engineer department.

5088. Instead of what?—Instead of as they are now, under the master-at-arms. I would suggest that they be made senior to all the chief petty officers, as they come under the control of the chief engineer; and I will tell you my reason for that. I have known instances when a watch has been given leave to go on shore, the engine-room artificers have been busy about work in the engine-room, and I have had to ask whether they might be permitted to go with the watch next day. If placed under the engineer department such leave might be given by the chief engineer; that would meet all the requirements, and they would be satisfied. I would also suggest that they should have a separate mess to themselves, and

a servant to wait upon them, instead of having to do the menial work themselves. They get good pay before they come into the service, and they have a comfortable home, and all their meals and so on are prepared for them; whereas when they come into the service there is nothing of that kind, they have to clean their mess, scrub decks and hammocks, and do all those sort of menial duties which are great drawbacks and prevent us from getting good men to come into the service, and if they do come in it makes them discontented.

5089. Where do they mess on board the "Agin-court"?—On the lower deck forward.

5090. On the mess deck?—Yes.

5091. With whom do they mess; with the schoolmaster and the other chief petty officers?—Yes.

5092. The other executive chief petty officers?—Yes; the master-at-arms and ship's corporals mess by themselves.

5093. They mess with the chief quartermaster and the chief captain of the forecabin?—Yes, they mess with them.

5094. Have they got any boy to attend upon them?—I am not aware of that.

5095. If they had a boy to attend upon them and to clean their mess, one serious cause of complaint would be removed, would it not, as is the case in many ships?—Yes. I have myself set a stoker to clean it for them sometimes.

5096. What regulations have you about their leave in the "Agin-court"?—It is entirely under the control of the chief engineer.

5097. After they have got the permission of the chief engineer, do they go to the commanding officer or to the master-at-arms?—The master-at-arms; in all ships I have been in it has been so, and it is the case in the "Agin-court."

5098. Have you heard any complaints about their uniform or their chest?—Yes, about their chest; they would like to have the original size chest which was 3 feet 4 inches long by 2 feet square.

5099. Do you think that is a reasonable cause of complaint?—Yes, for this reason: they have to have engine-room clothes besides other clothes, and therefore they require more room for them than the other chief petty officers require for their clothes.

5100. Have you ever personally inspected an engine-room artificer's chest with the object of ascertaining whether his complaint was a reasonable one?—I have not. I arrive at my conclusion in consequence of knowing that they require extra suits of clothes; they require more clothes than the others, and, therefore, I think that their complaint is just.

5101. Have any of the engine-room artificers with whom you have come in contact been good workmen?—Yes, very good, with only one exception.

5102. What trade was he?—A fitter. In two ships six altogether have come under my notice, and, with one exception, they were all good workmen. That was more especially the case in the "Rattlesnake."

5103. Did the engine-room artificers of the "Agin-court" ever work on board the other ships of the squadron?—Only the boilermaker.

5104. Was that only very occasionally or frequently?—Occasionally; it was only once, and that was at Gibraltar, when the "Coquette" was required to be got ready.

5105. What was he paid when at work on her?—That is a thing which has escaped my memory.

5106. Was it the usual check pay?—Yes.

5107. On the coast of Africa, in the flagship, is the artificer required more to work on board other ships?—Not necessarily.

5108. Does it occasionally occur?—It does; we were so moving about. In fact, in the "Rattlesnake" we could not have spared one; at one time we were left with only one engineer.

5109. (Captain Dowell.) Did your engine-room artificer keep watch?—Yes; he had to keep watch in

the engine-room. We were generally left through the exigencies of the service with only two engineers.

5110. (The Chairman.) Are your engine-room artificers in the "Agin-court" qualified to take charge of the engines?—I have sufficient engineers, so that I do not put them on watch there.

5111. Do you know whether they hold certificates qualifying them to take charge?—Yes, they do.

5112. Who gave them the certificates?—The chief engineers they had previously served with. They have to be examined by the inspector of machinery, but if not he, the chief engineer signs their certificate, and the captain of the ship approves it.

5113. Are you satisfied with the mode of entry of the engineer students; are you aware that it is open to any one?—Yes; and I suggest that it should be by nomination.

5114. By the Admiralty?—Yes; I would not have it open competition.

5115. You do not wish to lower the standard of examination for entry, do you?—No.

5116. If the candidates were nominated by the Board of Admiralty, do you think that those of a higher social class would offer themselves?—I do; their families would feel glad to avail themselves of the opportunities.

5117. Do you think that the fact of anybody being allowed to compete for entry now deters those of a better social rank from coming in?—I do; I think also, that if for the first three years little or no pay was given to them, it would be another inducement for a better class to enter.

5118. If they were nominated by the Admiralty, would not that have the same effect without charging their friends with a tax upon their education?—I think not; I think that the friends should have to support them, but by the present regulations they are allowed pay to support themselves.

5119. Supposing it was desirable to get the sons of officers in the navy and army to enter the service, and the sons of clerks in public offices, and others who may have large families and small means, do not you think it would be a great inducement to them to send their sons into the service if they knew that they were partially supported when they entered?—Yes, I do.

5120. Where did you serve your time?—At Woolwich.

5121. How long were you there?—For five years.

5122. As an engineer boy?—Yes.

5123. (Captain Dowell.) With regard to the distribution of the duties of the engineers, if you reduced your complement in the "Agin-court," how would you apportion the duties?—I would have one to assist the chief engineer.

5124. What would be his duties?—His duty would be to look after the register, and to assist and be responsible for the general duty of the engine-room as the senior; then I would have one for the double-bottoms, one for the fire quarters, and one in the engine-room for looking after it when not under weigh; three of those four engineers would keep watch in their turns in the engine-room under weigh (as general superintendent), with an engine-room artificer in the engine-room and one in the stokehold; the engineer should be responsible for the watch.

5125. (Captain Commerell.) You stated that you did not approve of the practical training of the students in the dockyards. Do you think it would answer to place two or three engineer students with each of the principal workmen, and his remuneration to depend upon the practical passing out of his students?—Yes, I do; and the leading men should have the supervision of the other men.

5126. Do you think that would be a good plan?—Yes, for the students to be placed with a man who is a practical mechanic, and he to be under the leading man.

5127. Do you think it would be a good plan to divide the students amongst the leading men, and to make their remuneration dependent upon the state of

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excellence in which each man turns out his students?—I do.

5128. You stated that you wished to see the engine-room artificers made senior to all the other chief petty officers. Has it ever struck you that to place a young man of 25, on first entry into the service, over the heads of men who have been selected from the large body of petty officers for their good conduct and intelligence, would be considered very unfair, and would cause a great amount of jealousy?—I do not think so. I think that the engine-room artificer belongs to quite a distinct race. He is a skilled artisan, and entered the service as such, the others did not.

5129. (*Captain Dowell.*) What would be your object in making him senior to the others?—So that he might be independent of the master-at-arms.

5130. (*Captain Commerell.*) Do not you consider that the complaint against the master-at-arms only means, but in other words, a complaint against the ordinary discipline of the service?—I do not think that at all. I think that the engine-room artificers are so distinct that they ought to come more immediately under the chief engineer.

5131. Do you think it would be better as far as possible to do away with all relative rank, to make them more exclusive, to remove them from the lower deck, and to put them under the chief engineer?—I do.

5132. During the time that you were in the "Rattlesnake," at the Cape, about how many days of check per month do you think the engine-room artificer of the "Rattlesnake" received?—I suppose about 15 or 16 days a-month; but that was quite an exceptional case.

5133. Do not you consider that that is more than equivalent to the overtime that a man working in private employ receives?—Probably; but opportunities like that would, perhaps, never occur again.

5134. During the time that you were in the "Rattlesnake" did you hear of any clashing between the master-at-arms and the engine-room artificer, relative to cleaning his mess?—I did not, because he was so much on shore that, as a rule, it was done by others; a stoker was sent to assist in cleaning the mess out.

5135. What do you consider should be the age of an engineer on promotion to the rank of chief engineer?—From 32 to 35; the maximum age ought not to exceed 35.

5136. Have you thought of what you consider the pay of an inspector of machinery ought to be?—From 30s. to 35s. a-day—30s. a-day for an inspector, and 35s. a-day for a chief inspector of machinery.

5137. You think that they would be satisfied with that rate of pay?—Yes, I think so.

5138. Are you aware that many chief engineers have declined to be made inspectors of machinery?—Yes.

5139. Can you give the Committee any reason for that?—A senior chief engineer has nearly the pay of an inspector of machinery; the maximum pay would be about the same, and they would have to serve for a

longer time after being made inspector, before they could retire.

5140. Have you seen this pamphlet, called "The Case of the Naval Engineers" (*handing the same to the witness*)?—Yes, I have.

5141. Does that meet your views in all respects?—Yes, it does with the exception of the pay. Although I agree with the pay, I certainly do not think that we can get it, therefore I would only advocate a more moderate rate of pay, and that which we should be likely to get. With the increased responsibility which is given to us now in the ironclad ships, I certainly advocate that rate of pay, and think that it is not too much to expect, but I would rather merely suggest what we should be likely to get, or that which we can reasonably expect to get.

5142. Have you ever been on half-pay?—Yes.

5143. For how long?—The last time I was on half-pay was for five months.

5144. Do you consider your half-pay adequate?—No, I do not.

5145. (*The Chairman.*) What was it?—12s. a-day at present.

5146. (*Mr. Wright.*) Do you count all your time?—Yes, all that is allowed to count. Three years junior time is what I am not allowed to count, after eleven years' service. I have been over eleven years chief engineer.

5147. (*Mr. Covey.*) You stated I think that the engine-room artificers had for nearly half their time extra pay at the Cape, what time have you seen them on extra pay in the channel squadron?—Only once.

5148. Have you ever in any other squadron seen them make extra pay?—Yes, in the squadron at Gibraltar, but only a few days, I have not had anything to do with the engine-room artificers except in the "Rattlesnake" at the Cape, and the case which I spoke of there was quite exceptional.

5149. (*The Chairman.*) Do you think that the system of promotion by seniority to the rank of chief engineer and inspector of machinery is good?—Yes, seniority entirely.

5150. Were you promoted by seniority?—I was promoted for my service in China.

5151. Do you think it would be better for the service if men were promoted only by seniority?—Yes, unless in cases of special or war services.

5152. But for the service?—In an exceptional case, I think that merit should be admitted, but if not then by seniority.

5153. Do you think that seniority gives one man a higher claim to promotion than another who has qualifications, energy, zeal, and work in him?—I am not prepared to say that; probably merit should obtain.

5154. Do not you find in all classes a great variety of qualifications and character amongst the men?—Yes, decidedly; what I mean to say, is that if there be nothing in the way of qualification against the senior man, he should be promoted, but if there were anything special in another man's case he then should be promoted.

(*The witness withdrew.*)

CAPTAIN GEORGE HENRY PARKIN, R.N., called and examined.

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5155. (*The Chairman.*) What ship are you now commanding?—The "Triumph."

5156. What ships had you previous to that command?—The "Victor Emanuel," the "Crocodile," and the "Falcon."

5157. Have you been to sea in the "Triumph" yet?—No.

5158. Have you had any experience of engine-room artificers in the service?—Yes.

5159. In what ships?—In my last three ships, that

is, the "Triumph," the "Victor Emanuel" and the "Crocodile."

5160. Can you give the Committee your opinion as to their efficiency generally, and with regard to what trades you think should be entered in the service as engine-room artificers, and what proportion should exist between those trades?—With regard to their efficiency generally I have found them most efficient; I do not remember one case of an inefficient engine-room artificer. I have noticed that they are generally

blacksmiths and fitters, and I should suppose that those are the trades most required in the engine-room. With regard to the numbers, the present proportion appears to me to be very good, that is to say, that if the junior engineers work in the same way that they have been in the habit of doing in the service, that is, putting their hands to manual labour, then I think the present proportion of engine-room artificers appears sufficient. I do not think that we have ever stood still in any work that we have had to perform for want of skilled labour.

5161. For the repairs of the engines?—Yes. I omitted to say that I should include amongst fitters boilermakers, because they are most necessary. In the "Victor Emanuel" I had great experience of engine-room artificer boilermakers, as she could not have made the passage to China in the way she did had it not been for their efficiency; they were so very good.

5162. Were the boilers in a bad state?—In such a bad state, that we found on arrival at Hong Kong we had actually been getting up steam against the sleepers.

5163. How many boilermakers had you?—We had a considerable number, as we were taking out spare ones for the squadron on the China station. I think we had at least four boilermakers amongst the engine-room artificers.

5164. Do you remember whether any of the other engine-room artificers were employed in repairing the boilers?—Yes, they all were employed.

5165. You say that if the present complement of engineers is maintained, you think that the proportion of engine-room artificers is good?—Yes; I think so.

5166. That is, on the understanding that the engineers work at manual labour?—Yes.

5167. Do you see any advantage in altering the proportion for other reasons of engineers and engine-room artificers in a ship?—None whatever. I should be very much against altering the proportion, as I think it is absolutely necessary to keep up our present class of engineers. I am very much against putting an engine-room artificer in charge of the stokehold, as I do not think that that class of man, when called upon in an emergency, is up to the position, and to the duty that a higher class of man would perform on those occasions.

5168. You think, then, that our present young engineers, fresh from training, are more efficient in charge of the stokehold, in a case of emergency, than an engine-room artificer would be?—I would not go so far as to say that, but I think it is an excellent training for a young engineer, being in charge of the stokehold, and, as you well know, they have very experienced men under them, in the shape of leading stokers, and I think it is a most capital way of getting instruction, by beginning at the lowest step of the ladder and working your way gradually up. I do not see how an engineer can be thoroughly competent without he first goes through the duties of the stokehold, and learns thoroughly the management of the boilers.

5169. Are you aware that with our present system in a very large number of ships the engineers have to go and take charge in the engine-room, immediately they are appointed to a ship, without any training in the stokehold, and that that is the case in a very large proportion of the ships in the navy?—Theoretically, such is the case; practically, I doubt it; as when we get the young engineers on board, we do not put them in charge of the engines, they are put to do other duties, so as to gradually accustom themselves to taking charge of the engines, they are put if possible for a certain time as second in the engine-room; that is my experience of it, and that has been my rule.

5170. Are you referring to ships that only have two or three engineers on board, which a large number of ships in the reserve have?—No, I am not, because I cannot speak of those ships, only having commanded

ships lately with a large number of engineers, of course in the "Falcon" our young engineers took charge, but they took charge of the stokehold as well, as it was close to their work.

5171. Do not you think that bringing up a young engineer in a small ship in that way is very good training, it is putting him on the lowest step of the ladder which enables him to take charge of larger engines when he gets them?—Certainly, but we must have a certain number of young engineers in a large ship, and I think that it is most important that we should have a knowledge of a large stokehold.

5172. How many assistant engineers have you in the "Triumph"?—I think we have only one.

5173. Are you aware whether in our large ships it is very rare to have more than one assistant engineer?—It may be so now, we had more in the "Victor Emanuel," she was my last ship, and we had more in the "Crocodile."

5174. What number of engineers had you in the "Crocodile"?—We had I think enough to put them in three watches in the engine-room, and I think we had two engineers in the stokehold, and the engine-room artificers took charge of another watch, I speak under correction, but I think that was the case, we were generally taking out extra engineers, and they used to do the duties.

5175. Do you consider that a troopship is a good school for young engineers?—Most excellent, and for second class stokers, in fact, for every one connected with the engines. I think there can be no better school than all our troopships; they are constantly running, and they see the hardest work and have very large engines.

5176. Are you aware of the present rate of promotion from engineer to the rank of chief engineer in the navy?—I am aware that it is very slow.

5177. At what age do you think a man should be promoted to the rank of chief engineer for the efficiency of the service?—I think certainly nearer 30 than 40.

5178. The present age of the senior men on the list is 43, and it is increasing every year?—Yes.

5179. Do you think that a desirable system to keep up?—Certainly not.

5180. Have you any suggestions to offer to the Committee with regard to a means for expediting the promotion; the engineers being now in the proportion of about four and-a-half to one chief in number?—It is a subject which requires a great deal of consideration, no doubt. There are many men who get to be seniors on the list whom it would not be desirable to have as chief engineers, at the same time their services are such that they should have a retirement to go back upon that would compensate them somewhat for not being promoted; that is the only way that I could suggest to get good and efficient men as chief engineers, and at the same time to expedite promotion.

5181. That system is adopted already. If an engineer remains on the list till the age of 45 without being promoted, he is allowed to retire on fair retirement, if he has not passed for a chief engineer?—Yes.

5182. That would reduce the list of engineers very slowly, would it not?—I was given to understand that there is one part of the promotion to the rank of chief engineer which acts rather against men who are promoted, at rather an advanced age, to the rank of chief engineer; that is, the time which they have to make up, cannot be made up before the time for retirement as chief has arrived. I think that acts prejudicially to the service; in fact, I think that a means ought to be given to a certain number of men to retire as engineers, upon a good or fair retirement, so that there might not be so many claimants to those vacancies which must naturally occur on the chief engineers' list.

5183. If we are to keep up the number of engineers in each of our ships, where are we to get them from. we cannot then reduce the number of engineers, can

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we?—No, but I consider that the junior list must be kept full, or fuller in proportion than the senior list, to be able to do the necessary work that the juniors have to do. For instance, in our own list, it is impossible that when we enter the service we can all expect to become Admirals, still we must keep the junior list very much fuller than the senior, because it is impossible to get lieutenants to do the work on board these large ships for want of lieutenants, and therefore that shows, I think, that we must keep our junior list well supplied, although all on it cannot be promoted to the highest grades; therefore, with that in view, I would give them an opportunity of fair retirement.

5184. Would you make the promotion to chief engineer more by selection than it is at present?—Yes, certainly.

5185. Would you recommend any proportion of promotion by seniority and selection; either half and half, or what?—I am not prepared to name a proportion.

5186. Do you find that the engineers of the present day have a disinclination to do manual work?—No.

5187. Have you found that they work well?—Yes, as young men, certainly; I have met with no disinclination on their part to work. I have always been on the most cordial terms with the chief engineer of every ship I have commanded, and if such a thing had taken place I should have known of it directly.

5188. Could you give an opinion as to the relative qualifications for manual work of the engine-room artificer and the engineers; which do you suppose is the better workman?—I could not give an opinion. I should say that an engineer would be best as a fitter, whereas an engine-room artificer would be best as a boilermaker.

5189. Why should you think that an engineer should be better as a fitter, if he has been the same time learning his trade as an engine-room artificer?—Because I think education gives a greater advantage to a mechanic's work.

5190. You would not wish to reduce the amount of education which they should receive?—Certainly not; I think that education suggests things in the use of tools which the bare practice of a mechanic would not suggest to him.

5191. Have you considered the question of the pay of the engineers at all?—No.

5192. Or that of the engine-room artificers?—No.

5193. If the proportion of engineers be maintained in a ship it is inevitable that the present slow rate of promotion must be maintained also?—Yes.

5194. According to that, then, an engineer cannot possibly attain the rank of chief engineer till he arrives at an age which is considerably higher than that at present, which is 43 or 45, do not you think that some change is desirable to prevent that being the case?—There is a large number of engineers about here who would retire if a sufficient inducement were held out to them to do so.

5195. And you think it would be desirable to hold out that inducement in order to quicken promotion?—Yes, because I think that everybody who has a good inducement held out to them works all the better for it.

5196. You do not find any difficulty in the engineers, with the high education they have at present, working at the same bench with the engine-room artificers?—I see my own doing it, and I have not witnessed any repugnance on their part to do so.

5197. Do you think it is a desirable system?—I think, looking at it as a matter of duty, it is a thing that must be done, and therefore it cannot be changed.

5198. Supposing engine-room artificers were entered instead of engineers, would not that change the system, if they were entered at fitting and boilermaking work, would not that prevent the anomaly of men of high education working so many years with their hands?—I should be very sorry to see it, because I

should feel that engine-room artificers were gradually eating the engineers away out of the service.

5199. But if the engineers were raised to a higher position than they hold at present, how would that act?—Then it would be with a view of taking manual labour away from them altogether, and I should be against that.

5200. Do you think it worth while our paying 12s. and 15s. a-day for men to work at manual labour, when we can get that labour done better for 5s. or 6s. a-day?—I question about its being done better; I think myself that it is a great advantage that the engineers should be considerably at manual labour, because it is a profession at which manual labour is absolutely necessary as well as a high knowledge of the other branches of their profession. I should be very sorry to see the time come when the young engineers had not manual labour to perform.

5201. You think then, it makes them so much more valuable, being kept at their fitting and filing work at the bench, notwithstanding the very important work that there is for an engineer on board ship in charge of the engines, double-bottoms, and valves, and watertight bulkheads?—I think so, certainly; I do not think they are always at work in that way, it is only occasionally when repairs take place, that they have to be constantly at the bench as you describe, and I certainly think it is a good thing and good exercise for those officers to do manual work.

5202. And you think that having only occasional work to do in that way, they can do their work as efficiently as engine-room artificers who have been brought up to that, and who have done nothing else all their lives?—I have already said that I think boilermaker artificers are better artificers than engineers would be in that particular branch; but I think as nice fitters, there are many engineer officers who are quite equal to engine-room artificers in their work, in fact I am certain of it, I have seen most beautiful work done by engineer officers.

5203. Do you refer to the older ones, or those now entering the service?—I refer to those whom I have seen, who are older than the present ones; I myself had an engine made a present to me, which was made by the junior engineers of the ship I was serving in, and it was the most beautiful piece of workmanship I ever beheld, although it had been done entirely by them in every way.

5204. Do you think it is the general impression amongst the engineers that they would like to be replaced by engine-room artificers or not?—I cannot say.

5205. You have not heard?—I have not, there is that desire amongst us all that we would get off manual labour as soon as we can, and I have no doubt it is the case with them.

5206. You would not like to see the engineers bear the same relation to the engine-room artificers that the executive officers bear to the executive chief petty officers?—No, not until they had attained greater rank.

5207. Why not?—For the reasons I have before stated, that I think they learn their profession more thoroughly by doing every part of it (which at a critical moment they may be called upon to perform) in their younger days, than by not doing it at all.

5208. By "younger days," do you mean up to the age of 43?—No.

5209. Then up to what age would you limit them, that is the point?—Yes, that is the point; but it is a point which is practically worked out on board ship; for instance, the senior engineer of the "Triumph" does the duty in his particular department which a senior executive does over the whole ship.

5210. Does he keep watch?—He does not keep a regular watch, he keeps the 4 to 8 watch; the manual labour really is done by the junior engineers of the ship, all that is required.

5211. Is that the case in all ships?—Yes, I think so.

5212. You would not suggest any alteration in the

present system of engineers, beyond retiring those who are considered unfit for work?—Yes, I would.

5213. What would you recommend?—I would suggest, as they rise in their standing on the list and in their service, that their pay should gradually increase, so as to make them more contented with their position.

5214. Would you introduce them into the ward and gun-room messes?—No; I think they are much happier and more comfortable where they are. I think at one time there was an attempt of that kind which fell through, and they went back to the old thing again.

5215. Are you aware of the social class from which the engineer students are now recruited?—I fancy they are entered from a great many classes. I have known the sons of naval officers and of engineers enter, and they go down much lower in the social scale.

5216. Do you think that any sons of naval officers have entered the service lately as engineer students; are you aware that there is no limit whatever to the social position of the parents of the candidates?—I am not aware of that.

5217. They are the sons of dockyard labourers, privates in the marines, washerwomen, and everything else?—Indeed, I did not know that.

5218. That being the case, do you think it is a good system?—No.

5219. What would you suggest; that they should be nominated by the Board of Admiralty, or by selection in any way before examination?—It is a new question to me, and I am not prepared to answer it without consideration, but I do not think the present system is a good one. You asked me about entry into the gun-room mess. My idea of that is this, engineers are generally a much older set of men than the young gun-room officers of the present day. We all know what boys are, and very likely if they found, as no doubt they soon would find, that there was an inferiority in the social position, they would turn round and chaff those officers, who might be, nevertheless, much superior to them in intellect.

5220. I presume, if such a thing were thought of, they would be entered according to their age in the ward and gun-room messes?—Yes.

5221. What number of stokers had you in the "Crocodile"?—We always filled up with an immense quantity. We had about 40 stokers, and half of them were always second class.

5222. Do not you think that the proportion of nine officers to 40 stokers is a very large one?—Yes.

5223. But you would wish to maintain it?—Certainly. I do not consider that the officers are so much over the men, as that they are in charge of one of the most important parts of the ship.

5224. If a man of lower pay could be found, who would take charge of the engines with equal skill or greater skill than a young engineer, do not you think it would be advantageous to substitute him?—I do not. I am for improving the social position of engineers, having men of good social standing as engineers, as I think there are critical moments when you want men of a certain social position to do the work.

5225. Do not you think that one great way of improving the social position of these men is by giving them a good education?—Yes, certainly.

5226. Do not you think that if you give them a good education, you will induce men to come from a higher social position; if the manual labour they have to do were decreased, but still having them thoroughly trained to the manual work, so as to be able to do it on emergency?—I have not seen so much manual work as you describe; there is only heavy manual labour at times; at other times there is no heavy manual work. Of course, in fitting out a ship, no doubt there is a great deal of manual work which engineers have to do, and I should be disposed to say that in those cases it could be done by the engine-room artificers; but I myself am of opinion that the engineers themselves should do the casual repairs to their own

engines, and I think it would be much better for the service if they could always do them. By that means they become thoroughly acquainted with the anatomy of an engine, as it were, in the same way as a surgeon becomes acquainted with the anatomy of the human frame.

5227. During the last 10 or 12 years the proportion of engineers has been very much reduced, and engine-room artificers have been substituted in their place, do you think that a good thing?—I think it has been, but would not go any further.

5228. (Captain Dowell.) What duty did the engine-room artificers do in the "Crocodile"?—When they were not actually employed on the engine, looking after certain parts of it, they were effecting repairs that could be done when the ship was under way. Of course in harbour they were always doing repairs to the engines, one of the engine-room artificers had charge of one watch in the stokehold, because we had not enough engineers to do all the work.

5229. Where did they mess?—They had a separate mess entirely, under the top-gallant forecastle.

5230. Was the arrangement satisfactory?—Very.

5231. There was no difficulty with it?—None whatever, they lived by themselves, as we were able to give them a place entirely to themselves.

5232. In the "Triumph" your engine-room artificers mess with the chief petty officers, does that arrangement work well?—I have not had an opportunity of judging, when I joined the "Triumph" they had a common mess-table, and lived as you say, with the chief petty officers; they have now an enclosed space, and are made much more comfortable, and from what I have been able to ascertain, I fancy that they are very well contented, as they were given their own choice about the position that they would have their mess placed in.

5233. How do the arrangements for leave answer with them, have they to go through the master-at-arms?—Nominally they have, in fact you may say certainly they have, because they give in their names to the master-at-arms, the same as the other petty officers; but as long as they behave themselves there is no further trouble.

5234. Where do they muster for inspection?—With the petty officers.

5235. (The Chairman.) The chief petty officers?—The petty officers.

5236. (Captain Dowell.) At divisions they stand out to the centre of the deck, while the men are at the side, and *vice versa*?—Yes.

5237. Have you any idea as to whether those men would be likely to re-enter again after their 10 years?—I think that whilst I have been in command one has; but I will not speak positively.

5238. You suggest that the old chief engineers should be retired?—Yes.

5239. That would make no more than a temporary relief, would it; the list would again soon be clogged?—Certainly it would, just the same as our own list is clogged, but you can reduce the list.

5240. Do you know anything about the engineers in the merchant service?—I have taken several cruises in the Peninsular and Oriental Company's steamers. The chief engineer of the "Peshawar," the vessel I came home in in January, seemed to me to be a highly intelligent man, but not in any way superior to our own engineers.

5241. I imagine that in those services it is only the really intelligent men who do rise to the top of the list?—Yes.

5242. And that another man, without reference to age or anything else, would remain in the junior grade all his life?—Yes, and I was led to suppose that they get recommendations from the firms who put the engines into the ships, from what I was told on board.

5243. (Captain Commerell.) By keeping up the relative number of junior engineers to chiefs at four and a-half, and offering inducements to the seniors to retire, are you aware that the promotion must be,

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as in our own case, very spasmodic?—I think it will be at first, but I anticipate in our own case, as I have quoted it, that in a few years there will be a good and steady flow of promotion.

5244. Are you in favor of the engineer students being admitted to study in the dockyard entirely subject to open competition, or would you have nomination by the Admiralty before open competition, the same as it is with other classes in the service?—I am very much against open competition. I do not believe in it. I am quite against open competition.

5245. You think that it does not insure our getting the best men?—I am certain of it.

5246. With respect to an increase of pay to the engineers, where would you begin; you are, no doubt, aware that an assistant engineer, the moment he enters the service, gets 6s. a-day; do you consider that is sufficient?—That is a question that I could not answer at present; but it is the principle that I refer to when I speak of increase of pay, and not the actual pay itself. Without more consideration I do not understand, and would not like to say, how it is to be done. I merely refer to the principle.

5247. You would not be prepared to propose any fixed sum at any fixed age?—No. I should go by length of service.

5248. You would think that an increase of pay should be strictly progressive?—Certainly.

5249. And therefore, then, that an engineer who found himself unpromoted after twelve or fourteen years' service would have a certain compensation by increase of pay?—Certainly.

5250. You are aware that there has been considerable discontent amongst the engine-room artificers generally in the navy; do you consider that their complaints have been well founded?—I have heard that there has been discontent, but I do not quite know upon what points.

5251. The principal points that we have had placed before us are these. First of all others, interference with, by the master-at-arms; secondly, discomfort in messing; thirdly, want of pay; fourthly, they want an increase in their pension; fifthly, the small size of their chests; sixthly, their uniform. Can you tell us of which of these points they have most cause to complain?—First of all with regard to the master-at-arms, I think that complaint is ideal. I can only say with regard to their messing, in the ships that I have commanded, that their comfort has been very much studied, and they always had some one to clean their mess.

5252. (*The Chairman.*) Do you think that is a good thing?—Yes, generally. I think that all chief petty officers ought to have their messes cleaned for them. There is no doubt about their want of pay. These men naturally look upon what men in their own position get on shore, but if they looked upon what people of the same rank as themselves got in the service, they must naturally see that their pay is very much higher; there are men in the service, chief petty officers, who have spent the best part of their lives in the service learning their profession, and they get small pay to what those engine-room artificers get in comparison as workmen; it is a question of supply and demand. With regard to their pension, if they claim and receive a very high rate of pay during the time that they serve, I cannot see how they can claim a very large pension when they retire, because working men of their own class on shore get no pension: a working man on shore has to provide for his after life, which these men, when they get a pension, have not to do. With regard to their uniform, I think it is a very good one.

5253. (*Captain Dowell.*) What is the difference between the uniform of the master-at-arms and that of the schoolmaster?—It is a difference that you would never detect.

5254. What is it?—I do not know what it is.

5255. (*Captain Commerell.*) We have heard it stated that the engine-room artificers occupy an invidious position on board ship, and it has been sug-

gested that they should be made senior to all the other chief petty officers; what is your opinion upon that?—Certainly not. I consider that the man makes the position. A chief engineer might say the same thing; but a chief engineer is treated with the greatest respect, if he has that respect for himself, which all I have seen have had.

5256. (*Mr. Wright.*) I think you expressed an opinion that the engine-room artificers should not be put in charge of the stokehold; would that apply to all classes of ships, or only to large ones?—I expressed that opinion because I think there is an opinion, gaining ground in the service, that the engine-room artificers should take charge of the stokehold. My opinion is that, as a rule, an engineer should take charge of the stokehold, and not an engine-room artificer. Of course in small ships it is only natural that an engine-room artificer should take charge of the stokehold, because it is impossible to have so many engineers in small ships.

5257. Are you aware that in a good number of gun vessels during the last year or two there have been only two engineers and two engine-room artificers appointed, and in those vessels the engine-room artificers not only take charge of the stokehold, but of the engines at the same time. You would not consider that a good arrangement, I suppose?—I would not go so far as that. I think in those small vessels, something of the kind must be done, but it should not be allowed to creep in as a rule in our larger vessels in the service.

5258. Have you heard that there is a general feeling amongst the engineers in the service, that they, as commissioned officers, should not be employed in doing such work as repairs to engines generally, I do not mean in cases of emergency?—I have not heard that, and neither have I seen any of the seniors do manual work; the manual labour, to the best of my belief has been confined to the juniors of the engineer staff.

5259. Do you think that so employing young engineers who are commissioned officers tends to lower them at all in the opinion of the other officers of the ship?—Not at all.

5260. (*The Chairman.*) If the engineers are retained in their present proportion on board each of our ships, of course it will be necessary to retain the present proportion of engineers and chief engineers on the navy list, that is, four and one-third to one; there are four and a third junior officers to one senior officer; do you think it is possible ever to maintain a good flow of promotion with that proportion, looking at other classes in the service?—It is a thing which has not yet been attained, but I think, looking at our own branch of the service, that we are going the right way to work, and that in a few years we shall have a very steady flow of promotion in our own branch, therefore it would apply to other branches.

5261. Are you aware of what the proportion of lieutenants to senior officers is in our own branch?—I know of lieutenants there are 630, and of captains 170; but I am of opinion that we are 400 lieutenants too short; we ought to have 1,000 lieutenants.

5262. The present proportion of lieutenants to senior officers is one and three-quarters to one, and yet do you consider that promotion is sufficiently rapid?—I think I have already said that a great many officers could never expect to be promoted, but they could have almost an equivalent in good and early retirement. You will have a much better chance of getting the very best chief engineers by keeping a large stock of junior officers, than you would by only having a small stock, from which you could only make a small selection.

5263. Then you would entirely change the present system of promotion by seniority?—To a certain extent.

5264. Do you think if a good retirement were offered to induce the men to go, that the best men would go, or not, to find work elsewhere in the private trade?—I think that the Admiralty ought to put their

veto upon those men going whom they wished to keep.

5265. And offer a high retirement to the worst men?—Certainly, if of good character and long service.

5266. (*Captain Commerell.*) Are you aware of the proportions of the various ranks; there are 182 chief engineers, 728 juniors, 209 surgeons, and 209 juniors, 190 paymasters and 278 assistant paymasters, and in the navigating class there are 261 in the upper rank to 120 in the lower; were you aware of that?—Yes, but I do not think that we can judge of what the proportion of one rank ought to be by making a comparison with another rank, because the duties are so different.

5267. (*Captain Dowell.*) Do not you think that under those circumstances, if you do not give them promotion you ought to give them an increase of pay?—Yes, that is exactly what I have said; I cannot say what it should be, but they should have progressive pay.

5268. (*Mr. Wright.*) I think you said that you would like to see the engineers do all their own repairs?—As far as they can; when going to a port, for instance on the coast of Africa, where there is nobody else to do them.

5269. In that case, would you propose going back to the system which existed ten or a dozen years ago, and dispense with the engine-room artificers altogether?—Certainly not; there is one particular duty that the engine-room artificers are good men for doing, I think, and that is the repair of the boilers. I must say that I like to see an engineer go in and see to all that, but I do not like an engineer to go living in there like the men who must remain in to repair the boilers; they must remain there for days and days.

5270. (*Captain Dowell.*) How many engineers had you in the "Crocodile"?—One chief, eight assistants or engineers, and three engine-room artificers was the complement, but we were always taking more.

5271. Do you think that your staff in the "Triumph" is sufficient?—No, I do not.

5272. What do you think it should be?—According to my idea I would have, besides the chief engineer, a senior engineer, who would do nothing but a first lieutenant's duty, and keep the 4 to 8 or the 4 to 6 watch, and another who should be a man that could specially attend to the valves and watertight spaces, &c.; three other engineers junior to the above to keep watch in the engine-room, and three assistant engineers to keep watch in the stokehold.

5273. That increases your number by three?—Yes.

5274. (*The Chairman.*) Would you increase the number of engine-room artificers in the same proportion?—No.

5275. (*Mr. Covey.*) Would you recommend that two chief engineers should be appointed?—No; because

then, I think, there would be "Two Kings at Brentford," and that would be very bad. I think that the system of having the next man to the chief an engineer is a very good one, as it keeps him on the *qui vive*: he does not know at what moment his chief may fall sick; and that is the time when he shows if he is able to do the duty as well as the chief engineer. Of course there are many engineers who can do the duty, and are perfectly fit to do the duty of chief engineers, if called upon to do it; they must be, if there be anything in them; and if they are not made chief engineers, it is through their bad fortune, and not their fault. My engineer is Mr. Stevens; and, from what I have seen of him, I should say that he was perfectly capable of taking charge of the engines as well as Mr. Capps, who is a most experienced chief engineer, and one in whom I would put the greatest faith.

(*The witness withdrew.*)

The following letter from Captain Parkin was subsequently forwarded to the Committee:—

"In answer to a question put to me by your Committee yesterday, I have the honour to inform you that I consider the clothes enumerated on the accompanying list to be a very fair kit for an engine-room artificer, and that the present chest, size, 3 feet \times 1½ feet, does not stow this kit conveniently. I would observe that the two suits of overalls, the blacking-brushes, three pairs of boots, and one suit of serge (working suit), would, as a rule, be kept in the locker or lockers assigned to the artificer in the stokers' bath-room; but even then the present size chest is small.

"Kit of an Engine-Room Artificer."

- 2 suits of blue cloth.
- 3 " " serge.
- 3 uniform caps.
- 2 suits overalls (duck).
- 1 monkey jacket.
- 6 white shirts.
- 6 coloured ditto.
- 6 flannels.
- 6 pairs of drawers.
- 6 " of white trousers.
- 6 " of socks.
- 3 " of boots.
- 3 towels.
- 3 neckties.

"Besides sundries, such as spare bed cover, clothes, and blacking brushes, comforter, &c.

"Articles which could be stowed in their lockers."

- 2 suits overalls (duck).
- 1 set of blacking brushes.
- 3 pairs of boots.
- 1 suit of old serge, working suit."

JOHN HENRY MACOY, called and examined.

5276. (*The Chairman.*) Where are you now working?—In the dockyard for the factory, on the new end of the ropery.

5277. Do you belong to the factory?—Yes.

5278. What are you?—A millwright and fitter.

5279. Have you been in the service as an engine-room artificer?—Yes.

5280. How long ago?—About seven years ago.

5281. How long were you in the service?—About eighteen months.

5282. Where were you before that?—Working in the factory at Keyham.

5283. How long were you in the factory?—About five years.

5284. And before that?—Before that I worked in London.

5285. In the private trade?—Yes.

5286. Where did you serve your time?—At Torr Point, as a millwright.

5287. Where did you go directly you were out of your time?—To London.

5288. What wages did you get?—30s. a-week.

5289. Where did you go?—To Messrs. Humphreys and Tennants, marine engine makers.

5290. As what?—As a fitter.

5291. Did you do duty as a fitter?—Yes.

5292. And from there you came to the dockyard factory?—Yes.

5293. What wages did you get in the dockyard factory when you joined?—30s. a-week.

5294. 5s. a-day for six days in the week?—Yes.

5295. Did you earn any overtime?—Yes.

5296. At Messrs. Humphreys and Tennants?—Yes.

Capt. G. H. Parkin, R.N.

8 Nov., 1875.

J. H. Macoy,

8 Nov., 1875.

J. H. Macey.
2 Nov., 1875.

5297. Did they work much overtime?—No, not very much.

5298. Were you paid by the day or by the job?—So much per job. We had to work 54 hours before overtime counted.

5299. Supposing you did not come to time in the morning, what was the result?—We were checked.

5300. How much?—For a quarter of an hour I was checked 2d., according to the wages a man got:—they will not allow you in after a quarter of an hour late.

5301. If more than a quarter of an hour late you lose the half-day?—Yes.

5302. Supposing you did not appear there for a couple of days, what would they do?—I should have got my discharge.

5303. Do you belong to a trade union?—Yes.

5304. Did you at that time?—Yes.

5305. What do you pay?—1s. a week.

5306. Do you pay that now?—Yes.

5307. What advantage do you derive from that; do they pay you when you are sick?—Yes, 10s. a-week if sick, 10s. a week if hurt, and 10s. if out of work.

5308. The same amount whether you are sick or hurt?—Yes.

5309. You get half your pay if hurt in the dock-yard?—Yes, and 10s. a-week besides.

5310. Are you married?—Yes.

5311. At your death will they pay your widow anything?—Yes.

5312. How much will she get?—£7; I should get £5 at my wife's death. If I were disabled I should get £100 down, and at the end of twenty years I shall get 9s. a week pension if I cannot work.

5313. (*Mr. Wright.*) To what society do you belong?—The amalgamated society of engineers.

5314. (*The Chairman.*) How much do you think that 1s. a-week would give your widow at your death, supposing you put it into an insurance office?—I do not know. We do not belong to a branch of that sort; I should not be putting away that shilling a week, perhaps, if we did. If we did not pay that 1s. a-week we should not get a job so easily.

5315. As an engine-room artificer in the navy you could afford to give up the trade union; it keeps you when sick or hurt, and gives you permanent employment, and pensions you with a large pension at the end of twenty years' service; it does everything except give your widow anything at your death?—Yes.

5316. Are you aware that 1s. a week paid to an insurance office from 25 years of age, instead of to the trades union, would give your widow £120?—No, I am not.

5317. That is worth consideration, is it not?—Yes.

5318. When did you enter the navy as an engine-room artificer?—On the 12th of June, 1868.

5319. To what ship did you go?—To the "Calliope" floating factory, as a fitter.

5320. How long did you remain there?—About two months.

5321. Then where did you go?—I was drafted to the "Northumberland," the flagship of the channel fleet.

5322. How long were you there?—For 15 months.

5323. Then did you purchase your discharge?—No, I applied for my discharge.

5324. And did you get it?—Yes.

5325. Without purchase?—Yes.

5326. Who gave it you?—I was only acting, I was not confirmed.

5327. Why not?—Because I did not ask to be.

5328. Did you bear a good character while you were afloat?—Yes.

5329. What made you wish to be discharged?—I did not like the service.

5330. What part of it?—Cleaning out the mess, and then I had to scrub my hammock or pay a man to do it for me.

5331. Was there anything else that you objected to?—I do not think there was anything else, except

that the master-at-arms had a great deal to do with me.

5332. What did he do?—When I wanted to go on shore he said that I could not go, or that I must go with the other men, and I had to wait till about eight o'clock, when the ship's company had done their work, while very often we knocked off at half-past three o'clock.

5333. How often did you get on shore when the ship was in port?—Only in regular watch; two nights ashore and one night on board.

5334. And you wanted to get on shore when your work was over, instead of waiting for the other men?—Yes.

5335. It was not a question of pay with you, but it was a question of treatment and comfort on board?—Yes, there was no position on board. I have had to take my hammock on the quarterdeck when they mustered the hammocks, beds, blankets, and caps.

5336. Where did you mess and with whom?—With the chief petty officers.

5337. The chief captain of the fore-castle and the chief boatswain's mate?—Yes.

5338. Not the master-at-arms?—He has generally got a place to himself.

5339. When you came back to the factory, what wages did you get?—I got 30s. a-week.

5340. What do you get now?—I get 6s. 2d. a-day now, 37s. a-week.

5341. That is a good rise?—Yes, wages have gone up.

5342. I suppose you would not advise any of your friends to go to sea as engine-room artificers?—They might please themselves.

5343. Do you think the points you have mentioned were the principal things of which you had to complain?—Yes.

5344. Do not you think that after you had been at sea for eight or ten years you might have got used to that sort of thing?—I do not think that any engine-room artificer liked scrubbing out the mess. I had not been accustomed to that sort of thing.

5345. But you would have got accustomed to it?—I would rather work ashore at my trade or in the engine-room. On board, Saturday is the general day for cleaning the mess.

5346. (*Captain Dowell.*) You clean out the engine-room, do not you?—The stokers do that; we look after the stokers.

5347. (*The Chairman.*) Have you kept watch at sea at all?—I had charge of the stokehold.

5348. Did you ever obtain a certificate that you were capable of taking charge of the engine?—No.

5349. Did you ever ask for it?—No.

5350. Did you like your life in the "Calliope"?—Yes.

5351. You got better pay there than in the factory?—I had seven days a-week, and looked forward to my pension, but when I saw what the service was I did not care for it.

5352. (*Captain Dowell.*) You did not think it was worth while waiting for your pension?—No.

5353. (*The Chairman.*) What age were you when you went to sea?—Twenty-five.

5354. What made you fancy going to sea?—Seeing many others go to sea, I thought I should like to have a trip.

5355. You do not remember what your chief inducement was. Was it the prospect of a little better pay, permanent employment, and a pension, or was it that you thought you would like to see something of the world?—I went for the pension in my old age mostly.

5356. Do you know what pension you would have been entitled to if you had remained in the service?—I am not aware.

5357. £1 a-week at the end of 20 years' service, and that without any deduction from your pay?—Yes; I did not know.

5358. Did you find your chest large enough to contain your clothes?—Yes; I had a middling size

one because the ship was large. I have no fault to find with the chest; it is only in small ships that it is not big enough.

5359. Did you ever do work in the boilers, tubing or repairing?—I have had to plug the tubes.

5360. But not shifting the tubes?—We had a boilermaker to do that.

5361. Did you help him at all?—Sometimes.

5362. Can you do any smith's work?—No.

5363. You never learned any engine-smith's work?—No.

5364. Can you work in wood?—Yes, I could make patterns for castings if required.

5365. (*Captain Dowell.*) What do you think of the uniform of the engine-room artificers?—I did not like the short jacket.

5366. What would you like?—I think the uniform ought to be similar to that of the writers, they wear a single-breasted frock coat.

5367. Would not the tails be continually in the way and getting greasy?—We generally put on a suit on purpose for the engine-room.

5368. What pay do you think is the proper pay for an engine-room artificer?—I think that they ought to rise according to their servitude; the pay should not always be the same.

5369. They enter for 5s. a-day, and that is for seven days in the week?—Yes.

5370. What would be the maximum amount to which they should rise?—To 9s. a-day.

5371. At the end of what service?—Nine years.

5372. Is there any position in life in which they could get that amount?—You get paid for extra hours on shore.

5373. Do you think there is any engine-room artificer who could get 9s. a-day on shore?—I know some men who are getting 7s. 6d. a-day.

5374. But you say you think they ought to get 9s. a-day for seven days in the week?—That is owing to the inconvenience they are put to in going to sea.

5375. They get rations and the prospect of a pension, is that nothing?—I think you want more pay for going to sea than you have at home.

5376. You do not think that the prospect of a pension is a sufficient inducement?—No, I do not.

5377. (*Captain Commerell.*) Do you think that a pension of £52 a-year after 20 years' service is enough?—It is a very good pension.

5378. Was there any other complaint that you had to make with regard to your treatment on board?—No.

5379. Did you ever find that the master-at-arms, with the exception of that question of leave, worried you unnecessarily?—No.

5380. He treated you exactly the same as he would have treated any other chief petty officer?—Yes.

J. H. Macey.

3 Nov., 1875.

(*The witness withdrew.*)

ROBERT NICOLL, Esq., R.N., called and examined.

5381. (*The Chairman.*) What is your present position?—I am first assistant to the chief engineer of Keyham dockyard.

5382. How long have you held that position?—Going on for 10 years.

5383. In Keyham dockyard?—Yes.

5384. What was the last ship in which you were chief engineer?—The "Renown."

5385. Have you had much experience of the engine-room artificers that have been lately entered into the navy?—None at all afloat.

5386. Have you had the examination of them?—Yes.

5387. For entry?—Yes.

5388. What is your opinion of them as to their qualifications?—Generally very good, and I think it is a good thing to have them in the service if qualified men.

5389. Have you had many men enter from the factory here?—I suppose we have had from 50 to 60.

5390. Have they been men of average qualifications?—Some of our very best workmen have entered, the men who used to take charge of the boilers on the trials of engines on the measured mile, and of steam launches.

5391. Has there been a larger proportion of boiler-makers than fitters?—No; more fitters.

5392. Any smiths from the dockyards?—No, no smiths at all; only one coppersmith.

5393. Have any smiths passed through your hands for examination from the private trade or elsewhere; any armourers?—I think there have been, but I cannot remember.

5394. You do not remember whether any armourers have come forward to be examined as fitters?—Some have come from the outside, but whether armourers or not I cannot say.

5395. Are the men that come from the private trade into your hands as good men as the others?—Yes, very good men; that is, judging from the answers to the questions I have put to them.

5396. Do you keep a list of the candidates, or is that list kept at the steam reserve office?—We could get it; we do not keep it in the factory.

5397. You do not keep it here of your own factory-men?—The factory immediately does not do it; the cashier of the factory does it.

5398. Directly a factoryman applies for entry as an engine-room artificer do you send his name to the steam reserve office?—Yes, with a certificate.

5399. When a factoryman applies to enter as an engine-room artificer do you put him through a test examination or judge of him from what you know of his ability in the workshop?—We ask the questions that we find incumbent upon us to ask according to the rules laid down in the navy list.

5400. The examination in reading and writing?—Yes.

5401. And knowledge of the steam engine?—Yes.

5402. Do you examine in that?—When the chief engineer is not there I do.

5403. Whose special duty is that, is it the duty of the chief engineer?—Yes.

5404. After these engine-room artificers once join the service you never see any more of their work, I suppose?—Not unless they give it up, and come back to the factory.

5405. Do you think that the pay we offer is a good scale of pay, and one which is likely to get good men?—We can get men, but not good men, for that pay.

5406. Do you think that an increase of 6d. a-day on entry, and rising up to 7s. 6d. a-day, after ten years' service, would be a good inducement for good men to enter?—I do not think that you will get good men to come at that scale.

5407. You know what the present regulations are, I suppose?—5s. a-day on entry and 5s. 9d. after three years, and no rise at all after that.

5408. You do not think that 7s. 6d. a-day at the end of 10 years would get good men, to enter the service?—I do not think so, because you have to compete with the mercantile marine; for those men you want are good and experienced men after ten years' service, and would go into those ships as engineers; I mean the merchant service.

5409. What pay should you suggest that we should give?—I think 9s. or 10s. a-day.

R. Nicoll,
Esq., R.N.

3 Nov., 1875.

R. Nicoll,
Esq., R.N.

8 Nov., 1876.

5410. At the end of how many years do you mean?
—At the end of ten years.

5411. Should not you think it likely that when a man has got ten years' service, with the prospect of a pension, that he would be induced to remain in the service to complete his twenty years for less than 9s. a-day?—You might get some you might get boilermakers.

5412. But a fitter is a higher-priced man?—Yes, a man who could take charge of a watch immediately.

5413. From your knowledge of the service generally, although it is some years ago since you were afloat, do you think it would be desirable to reduce the number of engineers in the navy, and substitute for them engine-room artificers; that is, for the junior ones?—You could just do away with as many engineers as you introduce engine-room artificers.

5414. In a ship like the "Sultan," there is one chief engineer, nine engineers, and four engine-room artificers; what should you think would be the lowest number to which we ought to reduce that complement?—There should be five engineers, and I would make up the rest of the complement with engine-room artificers.

5415. Have you seen any of the young engineers at work in the service lately?—No, not as they pass away from the factory.

5416. Not after they have served their time?—No.

5417. Do you think that the engineer student who has been at work for six years in the factory, and at school, is as good a workman at the end of that time as a trade boy?—No, certainly not.

5418. You think that the trade boy is the best of the two?—Yes, certainly he is.

5419. Do you think it would be a good thing for us to get those trade boys to come into the service as engine-room artificers?—Yes, a very good thing; but they ought to have experience before going into the service as engine-room artificers; if they went immediately they were out of their time they would not be fit for it.

5420. At what age are they out of their time?—At about 20 to 21 years of age.

5421. Why are the trade boys better workmen than the engineer students?—Because they are continuously kept at their work, and there is no stoppage whatever, such as attending school during working hours, &c.

5422. Of that you have no doubt?—Not the least doubt.

5423. A trade boy at the end of six years is a better workman than an engineer student?—Yes.

5424. (*Mr. Wright.*) At his own branch of trade?—Yes.

5425. (*The Chairman.*) In the case of a trade boy, it is confined to his own branch of trade, is it not?—Yes.

5426. An engineer student has a little knowledge of boilermaking?—Yes, and of coppersmithing and smithing also, but it is all superficial.

5427. During the ten years that you have been in Keyham dockyard, have you seen a large number of engineer students pass through here?—Yes.

5428. Can you suggest to the Committee any improvement in their mode of training?—As the pattern-making is the commencement of all mechanical engineering, they ought to commence with that. I would give them three years in the pattern shop, and while there learning pattern-making they learn to understand drawings, and not only that, but they also learn moulding, and obtain a knowledge of the shrinkage of metals. They could not make a pattern unless they understood drawings, and a pattern-maker often has to make his own drawings; and he cannot make a pattern unless he knows how to mould it, so that he is learning the whole business.

5429. Except the fitting and filing?—Yes; that he picks up in six months.

5430. Where did you serve your time?—In Dundee, in Scotland.

5431. How many years were you at work?—I was six years.

5432. What sort of a trade was it?—Making marine engines principally, but also land engines and spinning machinery.

5433. What sort of a course did they put you through?—I was three years at pattern-making and the remainder of the time in the drawing office and in fitting and erecting engines, and in running steamers that we made.

5434. When you were at sea, were you kept at manual work only, until the time you were made a chief engineer?—I joined the service as a second engineer, but was immediately put in charge of machinery.

5435. In what year was that?—In 1843.

5436. What ship?—I took a vessel to the West Indies; her name was the "Gleaner," and brought home a vessel called the "Carron."

5437. Do you think that the early part of the time of the students ought to be devoted to pattern making?—Yes.

5438. Do you think that they get enough instruction in drawing now?—Yes, I think so.

5439. Only you would apportion the time differently?—Yes.

5440. Do you have to examine the students, or to assist in examining them when they pass into the service?—When Mr. Trickett is not there, I do.

5441. In the event of reducing the number of engineers in the proportion you speak of in the "Sultan," and introducing in their places engine-room artificers, would that enable us to have a highly educated small body of engineers who would not be required to do so much manual labour as they do at present?—Yes; quite so.

5442. You think that a good thing?—Yes, I do; that is what we should aim at; but you must consider if you got a highly educated class of engineers you must do something to keep them in the service.

5443. Have you any trouble with the engineer students in the shops?—Not more than is natural from so many youths.

5444. What is the special trouble with them?—Skylarking, and various things; they get so many marks for theoretical education, that we often find them stowed away with mathematical books in their hands.

5445. Idling their time at mathematics in a corner?—Yes.

5446. However, although marks are a thing that they would work for, you have the power in the dockyard of preventing them from getting a certificate of qualification for practical work before they enter the service if you choose?—Yes.

5447. It rests in your hands to determine whether they are or are not practical workmen?—It hardly rests with us. They do not have the time to pick up the necessary amount of practical knowledge, and the experience necessary to go into the service with as junior engineers; after they have finished at college, I would give them two years at the factory in order that they might gain experience in the various kinds of engines, and so on; until they have done that they are not fully competent to go into a ship and take charge of a watch.

5448. To obtain a knowledge of the varieties of steam engines?—Yes, to take engines to pieces, examine, repair, and to put them together again, and so on, till competent; then they would see what was necessary to be done in the event of anything happening, and they would see the fittings of bulk-heads and watertight doors, and all the other fittings pertaining to his department about a ship, as far as the machinery is concerned.

5449. Do you think that part of the time now spent in the fitting shop might, with advantage, be spent in obtaining a knowledge of the marine steam engine in any way, and, if so, how do you think it could be accomplished?—Give them time to obtain knowledge.

5450. Where?—In the factory; chipping and filing is not the only thing; there is very little of that now;

it is boring holes and making joints, taking engines to pieces for examination and repair, and putting them together again.

5451. You think it is more important to a naval engineer that he should have a more thorough knowledge of the parts of a marine steam engine and the mode of repairing it, than being able to do that sort of work?—Yes, not only able to do it himself, but able to superintend also.

5452. How would you give them that knowledge?—By allowing them to remain a longer time.

5453. Where?—In the factory, and amongst the ships.

5454. Would you have them in the erecting shop, or what?—Yes, when the machinery of ships was in the erecting shop for repair. When we have a large amount of work in the factory, we bring in men from the ships where the work is scarce, and put them at work in the shops for repairing the machinery preparatory to its being sent on board ship again. The engineers might be doing this work, or seeing it done, and if they had charge of a vessel to refit it would give them a thorough knowledge of what was required in an engine-room, and more confidence when they went to sea.

5455. Do you think that they would be able to pick up much valuable knowledge in that way, unless somebody was specially appointed to instruct them?—They might be attached to a leading man on board a vessel having charge of it.

5456. Do not you think that a good naval engineer would be better able to instruct them than a leading man?—No.

5457. Not in a knowledge of the engine?—I think that they could gain a knowledge of the engines themselves (by reading); from the curriculum of study at the college they can acquire scientific knowledge, and a knowledge of the working of the engines, and all parts requiring most attention, as well as taking diagrams during the trial trips.

5458. How many engineers are there in the dockyard now assisting the chief engineer?—One other besides myself.

5459. Who is he?—Mr. Sennett.

5460. Do you think that the life of the engineer student, as laid down, is a good one altogether; or do you see any means of improving it in the way of giving them better washing places, and so on?—No; I think that they are pretty well done by.

5461. Do they take up tickets the same as the other men?—Yes.

5462. Are they searched by the police the same as the other men?—Yes, I think so.

5463. In fact, they are treated in exactly a similar manner to the other men?—Yes, while in the factory.

5464. And you would not wish to see any change made in that?—No; I do not see how you could make any change unless you made them a distinct class altogether.

5465. Does not it seem to you that they are going to be a distinct class altogether?—Yes, when qualified to be, but not till then.

5466. (Captain Dowell.) Are you satisfied with the social position of the engineer students, and the class from which they are recruited?—It is open to the world, subject to open competition.

5467. Do you think that the results are satisfactory?—Probably not; I can hardly tell what it is on board ship now.

5468. Do you know generally who the parents of the engineer students are?—Yes, I do.

5469. The sons of privates in the marines, and of dockyard labourers; do you think that is satisfactory?—I cannot say that it is, but if you did anything else it would be looked upon as a retrograde movement.

5470. Do not you think it would be better if the appointments were made by nomination?—You might get men from a higher social position, but you might get that in another way, even under the present system of open competition.

5471. Do you think the service would benefit if that were done?—In one way.

5472. Do not you think it would be altogether benefited by it?—I cannot see that.

5473. Do you think that introducing officers whose relations are of the class of dockyard labourers, is as satisfactory as introducing officers whose relations belong to a higher social class?—The service would benefit by it.

5474. Do not you think that a boy, who is the son of a person in a higher station in life, or the son of a gentleman, is likely to become a more efficient officer than a boy who is the son of a dockyard labourer?—I have no doubt that in a mess, or where the social position came to bear, that the gentleman's son as an engineer would be much more tolerated.

5475. Do not you think that the gentleman's son, educated for an engineer, and trained for that position, would be a better officer and a more efficient engineer than the son of a dockyard labourer?—Everything else being equal, decidedly; but it appears to me that it would be a retrograde movement if we went from the principle which is now laid down.

5476. Do not you think that if you have gone the wrong road and taken the wrong turning, it is as well to turn back again?—You have not the means of keeping that class of people out.

5477. Could you suggest any means?—I could; give them no pay. For instance, the education and the practical training which an engineer student gets is worth £1,000 to any father of a family. Many gentlemen pay a high premium to get their sons into a private factory to be trained as mechanical engineers, and they do not get half the attention paid to them that our engineer students receive, and our students receive a good theoretical education into the bargain. If naval engineers were treated as *bond fide* officers, these gentlemen would covet such positions in the navy for their sons, and you would have no want of applicants.

5478. You think that would be preferable?—Yes, it is my opinion that it would be preferable.

5479. Many people could not afford to keep their children for the time without their receiving any pay for it?—Probably not.

5480. Do you think that the pay of engineers generally in the service is satisfactory?—No, far from it.

5481. What would you suggest to improve it, commencing with the pay of an engineer and proceeding to that of a chief inspector of machinery?—I am hardly prepared to go into that, but I fancy that the old engineers whom we have now, certainly ought to get some remuneration, as they have no chance of obtaining promotion; they are able fellows, capable of doing anything, and yet there they are without a chance of promotion and receiving not more than 10s. a-day, with nothing to look forward to.

5482. If the government succeeded in carrying out the suggestion of reducing the number of engineers the promotion would be quicker?—It would be a little, but very little.

5483. What do you think should be the pay of an engineer after ten years' service?—I am not prepared to go into that, as I have never thought of it.

5484. Have you seen this pamphlet entitled "The Case of the Naval Engineers"?—Yes, I have seen that.

5485. Do you think that would meet their case, or that they could reasonably expect to receive such pay as that mentioned?—I should say that it was very liberal, at any rate.

5486. Are you on full-pay at present?—Yes.

5487. (The Chairman.) Do you get your pay as chief inspector of machinery afloat?—Yes.

5488. Have you any allowances besides that?—Yes, I had £30 added to it last summer.

5489. (Captain Dowell.) What is your pay?—£530 a-year.

5490. That is after 32 years' service?—Nearly 33 years.

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5491. Is that satisfactory?—I do not think so.
5492. (*Captain Commerell.*) Do you consider that an engineer who has once been master of the practical part of his profession will always be able to supervise the manual work of those under him?—Yes, I think so; he ought to be able to do so. I should think it it was unsatisfactory if he were not able to do so.
5493. Do you think it would be advisable for the best practical workmen in the yard to have two or three of the students placed under them, and to receive a remuneration according to the degree of perfection in practical work to which they brought those students, instead of their working, as they do now, in large bodies?—Yes, I think that is the best way to train them; and that is what I propose you should do.
5494. Is that the reason why you say that the trade boys are better workmen than the engineer students?—Partly so; some are not attached to men, they are working contiguous to them, but by themselves.
5495. You mentioned that you did not consider that the class from which our present engineer students sprung was quite satisfactory?—No.
5496. But you would hesitate to alter it?—It would be looked upon as a retrograde movement. By the present system you get the best intellect and the cleverest boys, but not those with the best physique, perhaps.
5497. Do you have a great many to choose from?—Oh, yes; 40 or 60 candidates, perhaps, when there are only six or seven vacancies.
5498. If you drew those boys from a higher social class, which you could easily do if you made it worth their while to come in, do not you think that you might get an equally good proportion?—Yes, quite; and, perhaps better.
5499. You do not consider that doing manual labour lowers a man in the estimation of anybody else?—No, far from it.
5500. A good workman who knows he is a good workman, whether he be a gentleman or not, does not suffer in that respect?—No, it is a very great acquisition, and is easily carried about with him. I do not consider that the fact of his being a good workman degrades a man in any way.
5501. I think you mentioned that you were not of opinion that the promotion of engineers would be much accelerated by the substitution of a good proportion of engine-room artificers for them?—No.
5502. Is there any other way in which you think that the promotion of engineers might be accelerated?—Yes, you might appoint chief engineers to smaller vessels.
5503. Would you lower the age at which a chief engineer might retire?—I do not know; that would be one means of accelerating the promotion certainly; but then you would lose men who were at their very best; you must have a large reserve I think. I think you are bound as a duty to have a large reserve of engineers. I know that during the Crimean war in the vessel I was in we had engineers sent to us that were not worth their salt.
5504. (*The Chairman.*) Whence did they come?—I do not know from where they came, but those I had were not worth having. We were obliged to get engineers somewhere, and may perhaps be again, and the country must be prepared to pay for them.
5505. (*Captain Commerell.*) In justice to the service, at what age do you consider an engineer ought to be promoted to the rank of chief?—I think he ought to be promoted to the rank of chief engineer at the age of 32 or 33.
5506. Do you think that there would be many senior engineers on the list if you were to give them a fair and reasonable retirement: taking into consideration that their chances of promotion are small; do not you think they would go?—Yes, I think so; they are so very discontented that a great many would go.
5507. Are you prepared to name the figure?—I have not gone into that question at all.

5508. Do you think that if we choose to pay a fair good price for engine-room artificers, we might get men who were thoroughly able to take charge of the engines of our smaller ships on watches?—I would scarcely recommend that, as I would prefer to see an officer in charge of the engines, a properly recognised engineer officer.
5509. (*The Chairman.*) It is not meant actually to take charge of the engines of the ship, but to take charge of the watch?—You could get fitters to do that, if you behaved liberally to them.
5510. (*Captain Commerell.*) What should you consider would be a fairly reasonable pension for an engine-room artificer to expect after 20 years' service, should you think that £52 a-year was a fair amount?—It would be a good pension, I should say.
5511. (*Captain Dowell.*) That is what they will get?—Indeed.
5512. (*Mr. Wright.*) You expressed an unfavourable opinion of the temporary engineers who were introduced during the Crimean war. You would not, I suppose, recommend following that course again?—No, certainly not.
5513. Then how would you propose to fill up the engine-room complement in our ships in the event of our having in commission a great many more ships than there are at present?—I do not see any other course, except keeping a large reserve, and some of them must be on half-pay, I suppose. But you will have always a large number discontented in a great service like ours, where many would prefer employment to idleness.
5514. Of what should that reserve be composed?—Of engineers.
5515. You would keep a reserve of engineers on the active list?—Yes; giving them an increase of pay when they had served a certain number of years.
5516. Do you think it will be possible to accomplish the same object by having a large reserve of engine-room artificers who have been trained at sea?—It would meet the case, if you had men upon whom you could depend.
5517. If you had a large reserve of engineers you could not profitably employ them, but you might the engine-room artificers on repairs in the dockyards. If a number of them were turned over to you at the factory, do you think that you could profitably employ them as workmen?—Yes.
5518. You do not see any objection to doing that, do you?—No; I do not see any objection immediately. Afloat they would be under the pennant, and subject to the naval discipline act, and when on shore they should come under the factory rules. Something in that way might be arranged, so that there should be no clashing between the naval and civil elements, or, man-o'-war's men *versus* factory men.
5519. You said that you would give the engineer students three years at pattern making. That would be very well for those who go through a superior course of training to become factory officers, but do you think it would be desirable for the great bulk of those who go to sea as naval engineers?—Yes; they would then be fit to do anything. If a vessel breaks down in the antipodes, they could make a pattern, and even do the casting; in fact, they would be fit to do anything in their profession with such training.
5520. After they have been at the college, you said that they ought to come back to the factory for a couple of years?—Yes, in order to gain experience.
5521. Would that be as engineers or as students?—I would not recognise them at all as engineers until they had been there that two years, then they would only be 23 years of age.
5522. You think they ought to be under training from about 15 to 23 years of age?—Yes, I think so.
5523. (*Captain Commerell.*) That would come out of the assistant engineer's time?—He would not be assistant engineer until he joined the navy.
5524. You would not keep him so long, would you?—Yes; but then he would be fit to take charge of

a watch, and fit to be a chief engineer almost, if he chose, were he trained like that.

5525. You would abolish the rank of assistant engineers?—I would make them engineers and chief engineers.

5526. (*Mr. Covey.*) I think you said you would appoint chief engineers to smaller vessels?—Yes.

5527. At present they are appointed according to the nominal horse-power; would you rather have it according to the indicated horse-power?—I should think that indicated horse-power was the fairest plan; the nominal horse-power is very deceptive.

5528. What indicated horse-power would you take for a chief engineer to be appointed?—Vessels of 200 and 250 horse-power nominal formerly carried chief engineers, and those engines would indicate about three times, that will be 600 horse-power; a vessel that indicates that ought to have a chief engineer, according to that scale.

5529. You were referring to the retirement of engineers; do you think that if engineers were allowed to retire at an earlier age they would take their retirement if they had to serve again, in case of war, as a sort of reserve?—It must be stipulated; when they go on the reserve list, it must be understood that they are to return when required to do so. Without that stipulation, very likely they would have something else to do which would prevent them returning when required.

5530. Do you think that they would be likely to take their retirement under those circumstances?—I could not say; but I think probably some of them would.

5531. (*Captain Commerell.*) We have not yet heard your opinion with regard to the desirability of doing away with the engineers' mess?—I think the engineers when they join the service (according to the views I have about their training, and so on), should go into the ward-room immediately. You give him the education of a gentleman; he has had an expensive training; he is fit to take charge of any of your engines; and therefore, I say, you must treat him liberally; by and bye he may get better offers, and then you will have trained an officer for somebody else. If you want to keep that officer's services he must be treated properly, both as regards pay and comfort, and position as well.

5532. (*The Chairman.*) How long were you in the ward-room mess yourself?—From the year 1847 until the time when I left the navy.

5533. Do you think that the son of a private in the

marines, or of a dockyard labourer, or of a washer-woman, who is kept in a fitting-shop for six years, is prepared to join the ward-room mess?—Certainly not.

5534. (*Captain Dowell.*) Have you got any fitters in the dockyard now who are receiving 9s. a-day?—Not as fitters. We have got some leading men who are getting that.

5535. But not a man who would take the position of engine-room artificer?—No.

5536. (*The Chairman.*) Have the engineer students at the present day any instruction in iron shipbuilding?—Yes.

5537. How is that carried out?—They are sent down to the other yards and they are working there among the shipwrights and people who are building the ships.

5538. Are they put under any leading men there who have to teach them?—I do not think so.

5539. Do you think it would be practicable for a junior assistant, or a chief engineer in the dockyard, or any one else well qualified, to give the students a lecture once a-week on the marine steam engine?—Yes; it would be useful.

5540. Do you think it would be useful and practicable?—Yes; useful and practicable.

5541. Would you like to give up a couple of hours out of the fitting shop specially to have a lecture on the marine steam engine once a-week?—I think that that ought not to be considered for a moment; if they are taken from their work they lose their interest in it; this is the principal cause of students being indifferent workmen.

5542. Would you like to see students sent to school for a week or a fortnight, and then sent to their work for three weeks, alternating in that way instead of having so many hours a-day for their schooling right off?—I do not think it would be a good system.

5543. You must educate these men, and in educating them how would you make their theoretical education march with their practical?—Only by schooling in the evenings.

5544. Would that be sufficient, do you think?—Yes, I think so, considering the college as well.

5545. Do you think that after ten hours' work a-day those young fellows would be fit to take in that schooling?—Yes; they are young, and they never tire. If the students did not get any pay, it is very likely then that, if the position of an engineer in the navy were to be coveted at all, it would be by gentlemen's sons, who would try to get in, especially if engineers were recognized as *bona fide* officers.

(*The witness withdrew.*)

Mr. AARON HILARY SYMES, R.N., called and examined.

5546. (*The Chairman.*) What is your rank?—An engineer.

5547. Of what standing?—Sixteen years in February next; eight years engineer last July.

5548. What year?—1867.

5549. Are you the engineer in charge of the "Vivid"?—Yes; for three years I have been.

5550. Where are you borne now?—In the steam reserve.

5551. Doing what duties?—Doing the duties of the chief engineer, who is sick, on board the "Valiant."

5552. Do you get charge money in the "Valiant"?—No.

5553. When did you enter the service?—On the 14th of February, 1860.

5554. Where were you before you entered the service?—I served my time at Messrs. Maudslay, Sons, and Field.

5555. The whole time?—Yes, five years.

5556. Did you come here directly afterwards?—Yes, I entered the service from there.

5557. When do you expect to be promoted to the rank of chief engineer?—Never.

5558. What is your age now?—38 years.

5559. If you were offered to be made a chief engineer now at once, or offered retirement, which would you choose?—I would retire.

5560. Do you think that would be the case with a large number of your brother officers?—Yes, I think so.

5561. Even if the alternative were given you of being promoted to the rank of chief engineer at once?—I think so, but I might perhaps hesitate.

5562. Where would you go if retired?—I would try for some other employment.

5563. Have you anything in your mind's-eye at all?—No, nothing particular at present; but my case is hopeless, as far as promotion is concerned, as I have not passed.

5564. You do not think that the system of promotion at present is satisfactory?—No, it is too slow.

5565. How would you improve it?—By increasing the number of chief engineers, and giving them employment in smaller ships.

5566. Have you ever thought to what number you could increase it in that way; you would not wish to

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increase the number of chief engineers beyond that number which we could employ, I suppose?—No.

5567. To what number could you increase it?—To about thirty more.

5568. What else would you do?—A larger retirement, I consider, should be allowed. I would give engineers progressive pay so as to give them a little inducement to serve on; at present the maximum pay is 10s. a-day, and you can serve on for ever and never get any more.

5569. Supposing all the engineers over 40 years of age were offered good retirement, have you ever thought whether that would bring you up to the top of the list?—Not for the next seven years.

5570. If an increase were made in the number of chief engineers that would bring you up earlier?—Yes, I am now 210 from the top of the list.

5571. At what age do you think a man should be made a chief engineer?—At not later than 35.

5572. You are not qualified for the rank, are you?—No.

5573. Why do not you qualify?—For the first 12 years that I was in the service, I served abroad nearly all the time; and when I saw where I was placed, I gave up all hopes of promotion, and never studied for the examination.

5574. Shall you retire at the age of 45?—That is the only thing to which I have to look forward.

5575. What pay will you then have?—10s. a-day, and 1s. a-day charge money, if in charge.

5576. And now?—10s. a-day.

5577. If the engineers were reduced in number, how would you fill up the vacancies in the ships?—By the substitution of engine-room artificers.

5578. Have you been shipmate with them?—Yes; in the "Defence."

5579. Have you in the "Vivid"?—No.

5580. How many had you in the "Defence"?—One boiler-maker and one fitter.

5581. Were you satisfied with them?—Yes.

5582. Were they useful men?—Yes; very useful, and always willing to work.

5583. Have you any suggestions to make to the Committee with regard to any improvement in the position of engine-room artificers?—I think that their messing accommodation should be improved, and that they should have a small progressive pay.

5584. What pay would you give them at the end of 10 years?—They should have 5s. 6d. a-day to commence with, and should rise to 7s. 6d. a-day as the maximum.

5585. You think that they should have better pay and messing arrangements?—Yes.

5586. Is there anything else?—They are annoyed by the interference of the ship's police, the master-at-arms; and I think that has been a great drawback to the entry of many of them.

5587. You are aware that we get as many as we want, I suppose?—No; I do not know that.

5588. You think that we should get a better class of men if we raised the pay a little, and did away with those disadvantages?—Yes.

5589. Do you think that they have any reason to object to their uniform?—I do not think it is any objection.

5590. They do not care about the jacket?—No; they do not mind it.

5591. Suppose when you were retired you were retired upon the understanding that you were to serve in the navy again in time of war, would that prevent you from taking your retirement?—I should consider it, because I should not be able to get employment if I were to be called upon to serve again at some moment.

5592. Supposing a reserve list were made, and men were put upon that list with a little higher retirement, and others were allowed to retire with a lower retire-

ment, the reserve list containing the names of those men liable to be called upon in case of emergency, to which list do you think the men would go?—That would depend upon the amount of retirement, or upon the difference between the two retirements; the men would want enough to be comfortable.

5593. Are you satisfied with the acquirements of the young engineers who join the service now?—I think that they are two well educated for the position they have to fill.

5594. Have you any remark to make about their practical training?—I think that might be improved.

5595. Supposing we enter a large number of engine-room artificers and reduce the number of engineers, could not we afford to have men of higher education if they were not put to manual work?—I do not think that manual work and their being officers at the same time are compatible. I do not think that an officer ought to take off his coat and turn up his sleeves to do manual work.

5596. If they are not to do manual work you do not think that their present education is too high?—No.

5597. Do not you think that it is of great importance that they should have this knowledge of manual work, so as to be able to direct others?—Most decidedly, yes; and in case of emergency to assist.

5598. Have you any suggestions to give to the Committee with regard to the pay which you would suggest for engineers?—I would suggest progressive pay as an inducement to serve on.

5599. What would you give them on entry into the service?—7s. or 7s. 6d. a-day, to progress after three years up to a certain limit.

5600. (Captain Dowell.) What limit?—13s. or 14s. a-day.

5601. (The Chairman.) As engineers?—Yes.

5602. And what for chief engineers?—That must be increased accordingly. A senior engineer I consider, ought to be about on the same footing as a chief engineer, so that there need not be much difference in the pay?

5603. Do you think that if the engineers were given a step in rank on retirement, that it would be any inducement for them to take it?—I think that the money would be a greater consideration.

5604. (Captain Dowell.) Do you think that the messing arrangements of the engineers is satisfactory?—I think that the engineers mess should be abolished; at the same time I do not see how it could be done at once, especially in large ships.

5605. Do you think that the present engineer officers who are entering the service could be introduced into the gun or ward-room messes?—Yes, I consider that their education ought to give them admittance into any society, at the same time I know there are drawbacks.

5606. You think that, without reference to the class of society from which they come?—I think that they should be appointed by nomination, that the candidates should be selected for competition.

5607. That it should not be thrown open to competition?—No, not thrown open to public competition.

5608. (Captain Commerell.) In your experience of engine-room artificers, do you think that their objection to being worried about by the master-at-arms, arises in a certain measure from the men being of a certain age when brought into the service, they enter it as full grown men?—They are of the same rank as the master-at-arms, and they, as skilled mechanics, do not like to be ordered about by him in the way they are.

5609. Is it the ordinary experience that they have been ordered about much by the master-at-arms?—I have heard many complaints about it, and seen it in the ships in which I have served; again they have no servant to clean their mess out, which is an objection; they have to do that themselves.

5610. That was in the "Defence"?—Yes.

(The witness withdrew.)

[Adjourned to to-morrow at 10 o'clock.]

THURSDAY, 4TH NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., J.C.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

JAMES BORLASE, Engine-room Artificer, called and examined.

5611. (*The Chairman.*) Where are you now serving?
—On board Her Majesty's ship "Iron Duke."

5612. What was your last ship?—The "Vanguard."

5613. How long were you in her?—From the first of last May till turned over.

5614. How long have you been in the service?—Five years and two months.

5615. Where were you employed before you entered the service as an engine-room artificer?—At Messrs. Revell and Hudson, engineers. I joined the service after putting the engines into the "Audacious."

5616. As what?—As an engine-room fitter.

5617. Have you ever served in the factory?—Yes. I joined the factory after the "Audacious" was finished. Mr. Elliott, the manager for Messrs. Revell and Hudson, gave me a good character, and said that I was a good fellow, and would like to join the service, and they took me from the factory. I joined on the 5th of October.

5618. How long were you in the factory?—About a week.

5619. What age were you when you joined the service?—23.

5620. What wages did you receive in the factory?—I had 36s. a-week with Messrs Revell and Hudson.

5621. After you were out of your time?—Yes, I was here for several years working as a hired man, putting in the engines of the "Seagull," and I was working on the "Daphne" for Messrs. Revell and Hudson.

5622. Both men-of-war?—Yes. Then I went to Glasgow for Messrs. Revell and Hudson to put the engines in the "Audacious," and I brought her round.

5623. What age were you when out of your time?—I was 21 in a few days after.

5624. How long an apprenticeship did you serve?—Six years.

5625. Did you pay a premium when you went in?—Yes; £20 when I went in.

5626. What pay did you get while there?—I got 1s. a-week for the first two years, then I rose to 2s. a-week, then 3s. a-week, and for the last year of my time I had about 6s. a-week.

5627. Directly you were put on work, what pay did you get?—22s. a-week, and then that rose by degrees to 36s. a-week; but you must remember that I was working for different firms.

5628. All private firms?—Yes.

5629. And then you joined the factory?—Yes.

5630. What made you prefer the service to the factory?—I thought I should like a seafaring life.

5631. Are you a married man?—I am now. I was single then, and I wanted to see the world.

5632. You entered the factory on certain wages?—I only received back pay for a few days; at that time there was an entry required of half a dozen engine-room artificers at once, and Mr. Barden asked Mr. Elliot if he had anyone that he could recommend. I was then working for him in the "Audacious" and he recommended me, and I was sent up to the office and went on board the "Calliope"; I was in her about two months, and then I was sent in the "Pigeon" gunboat (I had been to sea before and knew how to manage the engines), and I was away

about 4 years and 8 months; during that space of time I was sent to England with the gunboat "Pheasant."

5633. From what station?—The Mediterranean; Gibraltar.

5634. What engineers were there in the "Pigeon"?—Two engineers.

5635. Did you keep watch in the engine-room?—Yes.

5636. The whole time?—Yes.

5637. What engineers were there in the "Pheasant"?—One engineer, and I had to keep watch and watch for sometime; then we had one more engineer lent to us from the "Revenge" to bring the vessel to Portsmouth. After we returned to Portsmouth, I could not get any leave, as there was an Admiralty order for me to return to the "Pigeon," and I had to go to Malta; from there I went back to my own vessel at Gibraltar, and remained there till last November.

5638. What duty did you do in the "Vanguard"?—I was the officer of the watch in the stokehold.

5639. How many watches were there?—In three watches.

5640. Did you ever have charge at all of the working of the engines of the "Vanguard"?—No.

5641. How many engineers did it require to work the engines of the "Vanguard"?—To work quickly, and with competence, two.

5642. You never had anything to do with the working?—Only throwing them over the centre sometimes when there was an engineer there.

5643. What trade did you call yourself when you went there?—An engine-fitter.

5644. Do you know any smiths' work?—I can do a little at the forge; small drifting jobs. I can do boiler-makers' work; I had to do that at Gibraltar to two of the "Hart's" boilers; they had no boiler-maker to do the work.

5645. Do you like the service?—Yes, I like the service very well.

5646. Is there any change in your position that you would like to have made?—Yes, so that we should not come under the jurisdiction of the master-at-arms and also that we should be allowed proper mess accommodation. I had to mess for 12 months with the stokers in the "Pigeon," and because I could not come up every morning to clean my mess the chief gunner's mate, who took precedence of me and told me that he was senior, reported me, and I was obliged to leave the mess. The chief gunner's mate scrubbed his mess and the ship's steward had to do it as well; and I, because I could not attend from the engine-room, had to mess with the stokers, and without they are good sensible men, one cannot have any control over them; they say, "Why not go and mess in your own mess."

5647. Where would you have liked to mess in the "Pigeon"?—It would have been better to mess by myself, because I could have paid the cook a little extra and have got everything done for me; at present it costs me 8s. a month for a man to look after my hammock and wash extra clothes. I cannot attend to my hammock myself, and must pay some-

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one 5s. a-month to do it for me; I paid that in the "Vanguard."

5648. Did you ever try 4s.?—No, because I was in a small vessel and the men would not do it, or at least only a few; they would not be bothered, and, being young men, and always getting on shore every night, they did not care whether they did it or not; there is no trouble when you pay a man properly.

5649. Where did you mess in the "Vanguard"?—Forward, close to the galley.

5650. With whom?—The writer and schoolmaster, right before the marines; and we could not keep a thing in the mess; even victuals were stolen from us, and knives and forks were all taken because there was no one excused to look after the mess.

5651. Did the boys scrub the mess in the morning?—One boy on the watch below did, and, if not one of the writers and myself got up and scrubbed it. I asked the master-at-arms who was going to do it, and he said, "You, if you like." There is a boy sitting doing nothing all day in his office, and if you speak to him about it he refers you to the quarter deck, and the captain, who will not listen to you, because the master-at-arms has made his statement before you come up.

5652. Did not you expect when you joined the service that you would be subject to the discipline of the service?—Yes, but not scrubbing messes.

5653. Did you expect to be subject to the discipline of the service when you joined?—Decidedly, so far as possible, but not to scrub messes; I never understood that we had got to do that.

5654. Why did not you make inquiries?—We did, so far as we knew; we understood that there were two boys allowed to five chief petty officers.

5655. But you do not find them enough to scrub the mess?—One boy would be enough for that if he could be excused.

5656. Is there not a boy on watch below every morning?—No.

5657. Are they both in the same watch?—They are away; they do not have watch below in port; when at sea they have a watch below.

5658. (*Captain Commerell.*) Are you talking of the "Iron Duke" or the "Vanguard"?—Of the "Vanguard," but when I spoke about losing things, I meant in the "Iron Duke," because there is no one in the mess after the cooks are piped.

5659. (*The Chairman.*) Have you the same master-at-arms and officers in the "Iron Duke" that you had in the "Vanguard"?—Yes.

5660. When the hands are on deck, how do the other chief petty officers get the mess scrubbed out?—There are no other chief petty officers, no sailor chief petty officers.

5661. How is the mess cleaned out?—One of the petty officers comes and does it.

5662. The writer?—No, never him; he is always in the office.

5663. One of the petty officers comes off the deck?—Yes, and scrubs his own mess the other side where he is; the petty officers are all messed together.

5664. You said just now that you messed with the writer and the schoolmaster?—Yes.

5665. Who does clean your mess out?—One of the writers or myself.

5666. But you said that he was always in the office?—I mean if the boy is not there; if a man comes forward and does a bit of the mess, he is called and has to go away; he is not told off for the duty, and is not allowed to do it.

5667. What you mean is, that it is scrubbed either by the writer or yourself?—Yes.

5668. Did you expect when you joined the service that you would have a servant to attend to you?—No.

5669. How did you expect that your mess place was to be kept in a state of cleanliness?—I understood when I joined the service that there was a boy allowed by the Admiralty to do it.

5670. Had you always a servant to attend upon you when on shore?—I had my home to go to.

5671. How did you keep your own home clean?—The people that I lodged with kept it clean; I paid them for doing it.

5672. In the "Vanguard" how did you obtain leave to go on shore?—I first went to the chief engineer, and then to the master-at-arms to tell him that I wanted to go ashore; then I had to sign my name on a slate at the gangway as well. If I wanted any leave during the day, I had to go to the chief engineer first, and then to the master-at-arms for him to represent it to the commander. At 11 o'clock in the morning the master-at-arms came up, and made a statement that I wanted leave for such and such a time, and if I had the permission of the chief engineer I should get it, but, if not, I could not have it. The commander will not take anything from us unless it comes through the master-at-arms.

5673. How many have you in your mess now?—Seven chief petty officers and two boys.

5674. How many engine-room artificers are there?—Three, including myself.

5675. Would you rather mess by yourselves?—Yes.

5676. Where?—Somewhere parted off from the sailors and marines, so that they could not be continually jawing at you, and pitching potatoes and bits of bread into your mess, and come and sit at the end of the table, making remarks. I should not care where it was, so long as it was away from them.

5677. Why do they do that to you, and not to the others?—They do it to the others also, but the others take no notice.

5678. Why do you?—Because I do not care about it. Then, if I have the paper, they say, "Lend me that paper; what sort of a paper is it, old man?" And you must answer those people and tell them to go away; although they do not pay any attention, you cannot continually be reporting them.

5679. You would not call it an offence for a shipmate to ask you to let him read the paper after you had seen it, would you?—No, certainly not; but then it is the same when you have a book. They want to know what book you have got, and where you have got it from; and if you tell them it is your own book, they will not believe you, but will spin a yarn about one thing and the other; and if you tell them you want them to go away, they will not take any notice, but will laugh at you and say, "Go away yourself; you are a consequential sort of a man."

5680. Are you aware that the chief petty officers themselves complain of the engine-room artificers who mess with them, on account of their bad behaviour?—Decidedly, because the engine-room artificers refuse to scrub the mess and cook the dinner; they cannot come to do that.

5681. Are you aware that the petty officers, even in those messes where they do not scrub the mess, complain of having the companionship of such men as engine-room artificers?—No, I do not know it.

5682. They are selected from the finest service in the world, and they are the best of their class, and they feel an objection to engine-room artificers dirtying their mess and keeping company with them?—That is a certain class; there are some very dirty engine-room artificers that would always leave their trade mark on their stools, because they are too dirty to clean themselves, or to put a clean suit on.

5683. Do not you think, then, that if the engine-room artificers were to attempt to show more companionship with these men, who are selected men and good company for anybody in the world, that they would get on better amongst them?—I do not see that they are good company; if you want to become a thorough blackguard, then you can mix with those sort of people. They generally say, what a spree they have had on shore with the women, and so on. I speak of the young men just made.

5684. (*Captain Dowell.*) Those are not the chief petty officers?—I have not been shipmates with many, only the chief boatswain's mate and chief gunner's mate.

5685. Those are the people you mess with, are

they not?—There were no chief petty officers in the "Vanguard."

5686. (*The Chairman.*) Under all these disadvantageous circumstances, why do not you purchase your discharge?—I went up for it once and was told to go away. I was once here at the time the circular came out for stokers, and three who represented the body went up, and they all put in their own discharge. Captain Hamilton told us to remain 10 days to consider it; also, when we messed with the stokers in the "Pigeon," I went to the lieutenant, and he told me to wait till I got to England.

5687. Did you tell him that you had got the money ready?—I had not got it ready, but I could have sent to England for it.

5688. Why do not you purchase your discharge now?—I am very comfortable at present, and only am waiting to see if there will be any change.

5689. I thought in your present ship you were close to the marines and so on, who are annoying you, and asking you for your books and newspapers?—Some do.

5690. But you do not think the annoyance is sufficient to prevent you from remaining in the service?—Not at present. I have a very good engineer, and am all day long, from the time I come in the morning till dinner time, below. I have my dinner and then can go away to the flats and sit on my chest and read or do what I please. In the evening I go and clean myself and go ashore; I am not disturbed at present. There is one thing which I should like to mention to you that came to my knowledge this morning, and if you look into it it will be a great benefit for our class that lost everything in the "Vanguard." When I came into the "Canopus" they told me I could have a suit of clothes, and I had a suit off the contract; it is a simple tunic, but there are no pockets in it; the paymaster told me that there were £10 allowed, and from that £10 they deducted the cost of this suit, and bed, and blankets, leaving me about £5 to pay for the remainder of my clothes.

5691. What were your clothes worth?—They were worth about £24.

5692. Do not you think that whenever you get to sea you must, to a certain extent, run the risk of unavoidable accidents taking place, and although the Admiralty may furnish you with clothes enough to do your duty, they cannot be expected to furnish you with anything more?—No, that is true; but a young man who is going on a station after he has been in the service a little time, gradually picks up his things and gets a good chest of clothes.

5693. How much does a suit of clothes cost you?—£3 15s. We have to pay for clothes now, and there are several to make extra also.

5694. But if the contractor makes the suit, it is made according to the contract price?—But the government is not going to pay for it. He gets his own price. A suit of clothes was the thing I was to have, and when I went to the contractor I had a little cap given me with no badge on it, and I had to give 2s. for a respectable cap, and 4s. extra for a badge.

5695. That all comes out of the £10?—Yes; and also I have to pay for the bed and blanket. Even the sailors have not to pay for those, but the chief petty officers have to pay for them. The other chief petty officers have to pay for the same things.

5696. Do you know how much the sailors received for their kit?—They are going to have a full kit given to them.

5697. Do you suppose that will replace everything they lost?—No; because, after a man has been in the service for some years, he is continually picking up something, and adding to his stock.

5698. You can hardly expect the Admiralty to pay for those things?—No, not all; but what they give us is nothing in comparison with what we have lost.

5699. (*Captain Commerell.*) What do you suppose the Admiralty pays for a lieutenant's kit, for everything he lost on board the "Vanguard"?—I should

think about £30. I would give £10 for my chest, as it had my indentures and everything in it.

5700. (*The Chairman.*) What trades are the other engine-room artificers?—One is a boilermaker and the other is a fitter, the same as myself.

5701. Have you any smith?—No.

5702. Who does the smith's work in the engine-room?—We have a stoker mechanic that does the smith's work, and then I will go and lend him a hand; we work together and get a job done.

5703. Do you ever get assistance from the ship's blacksmith?—No.

5704. Is there any other point which you would like to see altered in your treatment and condition on board ship?—The only points are these: we want better uniform and better messes, and a little more pay, and to keep us beyond the control of the master-at-arms, so as to be out of the petty grievances with him. They even made us take the buttons off our jackets; after I had worn them for four years I had to take them off my jacket, and it ruined my jacket, and that was only because the master-at-arms was taken for an engine-room artificer, and he wanted to make a distinction; it was not the regulation. Captain Hamilton signed the paper, and sent it on board the "Calliope," that the buttons were to be taken off.

5705. Are you aware that when the Admiralty give regulations regarding uniform, everybody has to comply with them?—Yes, but the circular says that our uniform is to be the same as that of the master-at-arms.

5706. Who says that?—The circular says so.

5707. The regulations as to uniform are laid down strictly by the Admiralty, and everybody in the service, whatever may be their rank, has to comply with them. If you have any doubt as to what the uniform is, you can ascertain at the steam reserve office; is there any reason why you should wear a uniform that is not your own, and that makes you resemble some other officer?—No; but I wore the buttons for four years before it was found out, and I think that in Portsmouth, Lord Gilford was asked about the question, and he said, "Leave the buttons upon the sleeves"; that was about three years ago. An engine-room artificer went before Lord Gilford, and he told him to retain the buttons on the sleeve, and they were retained.

5708. Did Lord Gilford tell you that himself?—No, he did not.

5709. What pay do you receive now?—5s. 9d. a-day.

5710. Do you think that at the end of ten years you ought to receive higher pay?—Yes.

5711. What pay do you think you would earn by that time?—9s. a-day, that is, if we get a little better position, because it costs us a lot of our money now to find ourselves in little extra provisions, better than the service provisions, and then we have the hardship of being away from our own homes and at sea. If we were in the merchant service we should have a chance of getting on if we passed the Board of Trade, and of obtaining the position of first or second engineer; that is the position that I might get if I were to leave the service to-morrow and passed the Board of Trade at Liverpool.

5712. Then why do you not go away?—At present I am comfortable; but if I got annoyed I would leave the service, if I could leave it without expense. I have five years in, and I will try to rub out ten years, and if after that time it is not a little different I do not join again.

5713. (*Captain Dowell.*) Is not your pension an inducement?—It is no more than a petty officer's pension to look forward to.

5714. (*The Chairman.*) Can any petty officers ever get the same pension as you can?—Yes, a penny a-day for every year's service.

5715. Your pension is £1 a-week?—Yes.

5716. Do you think that any petty officer can get the pension that you obtain?—Yes.

5717. Are you aware that your pension will be £1 a-week at the end of 20 years' service if you behave

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yourself?—That depends a great deal upon the officer who writes for your pension; if you can get a good friend to write for you perhaps you may have an increase, whereas if you have no one to write for you you would not get it.

5718. Are you aware that by the regulations the officer, who writes for you, can have no influence whatever upon your pension; it is laid down by strict rules and regulations, and no officer can have the slightest influence upon your pension so long as your character be good?—I did not know that.

5719. Have you not a great advantage over other petty officers by joining the service as chief petty officer, whereas they have to serve abroad, and are separated from their families for some years before they can become chief petty officers?—Yes; but they have never been at the expense we have; they are trained after coming into the service, but we are trained before we go in, and if we are not found competent we are discharged again; whereas a petty officer is trained in the service at a great expense to the country.

5720. Do you call it a great expense to the country when a seaman is giving his services to the country as an A.B., a service that requires the utmost skill, which is dangerous, and is attended with much discomfort; do not you think he returns to the country what the country pays for him; the man could get double the pay out of the service if he liked?—I did not know that he ever could get double the pay. He does not get standing work; perhaps he might get a ship for one voyage, and then he might be three or four months out of work.

5721. Is it not the case that a man employed in a private firm cannot always get work, and do they get a pension at the end of their service?—No; but they have the advantage of rising higher, and we in the service have no such advantage.

5722. Has not a seaman the same advantage of rising higher in the merchant service?—Yes; but not in the navy; a man cannot enter as a petty officer from the shore, can he?

5723. Is it not an advantage to you that you can enter from the shore as a chief petty officer, but a seaman petty officer cannot do so?—No, a seaman cannot.

5724. Does not that give you a great advantage over him?—But that seaman is not trained when he comes into the service; if there was an entry for petty officers they could pass perhaps.

5725. You are entirely mistaken; no passing could fit a man for the position of petty officer unless he were trained at sea?—I am trained at my own private expense and he is trained at the expense of the country.

5726. That is the reason why you are entered as a chief petty officer, because you are trained at your own expense and he at the government expense; do not you consider that an advantage?—No.

5727. What pay could you get in a factory? You say that you ought to have 9s. a-day at the end of ten years?—In the first place 6s. a-day, and when you become a standing man in the factory, and are able to take a job of work on your own head, you might get 9s. a-day by taking that job and paying other men, as they do in a great many shops.

5728. In the dockyard?—In private firms.

5729. Could you be sure of permanent employment and a pension at the end?—No.

5730. Could you be sure of getting full pay while sick?—I do not think you always get full pay when sick; I think that when sick you lose pay when in hospital.

5731. Are you aware that you are kept on full pay for six weeks while you are in hospital, and during that time you are supported and cured at no expense to yourself?—Yes.

5732. Could you get that in a private firm?—We support ourselves out of the clubs; we pay so much a-week.

5733. Does the private firm pay for your club or do you yourselves?—We do ourselves.

5734. How many days a week are men paid for in private firms?—For six days.

5735. And for how many days a week are you paid now?—For seven days in the week.

5736. Do they give you any provisions in a private firm?—No.

5737. Do they in the navy?—Yes.

5738. (*Captain Dowell.*) What pension would you expect to get at the end of 20 years' service?—As it stands now I suppose about £50 a-year; but I should like a better pension if it were possible to get it.

5739. What grounds have you for expecting it?—Because, perhaps, a man may be disabled, or he may not have the strength to work. I, myself, have not the strength which I possessed when I entered the service. I cut my hand to pieces in the "Vanguard," and if I came out of the service I should not be able to compete with other men.

5740. Have you got a certificate for that?—The doctor would not give me one because there was no bone broken; but I cannot hold the chisel properly, as the inside sinews of my hand give way.

5741. (*The Chairman.*) How did that happen?—The senior engineer and I were trying to start the ash engine.

5742. Did you go to the doctor immediately?—Yes, I was taken.

5743. Have you shown it to the captain of your own ship here?—No; the doctor told me to wait for six or eight months and then come to him again.

5744. (*Captain Commerell.*) If you were in a private firm you would not get twopence; that is one of the advantages of being in the service?—But I should get something from the club. I should have got £1 a-week from the Hearts of Oak in London for this.

5745. (*The Chairman.*) Do they take men who are in they navy?—Yes, any one that does not go aloft can remain in.

5746. (*Captain Dowell.*) You asked the doctor to sign a certificate?—Yes, I asked him for a smart ticket.

5747. (*The Chairman.*) You cannot get a smart ticket until he says you have got a permanent disablement?—No.

5748. (*Captain Commerell.*) Are you a Truro man?—No, I was born in Devonport.

5749. (*Captain Dowell.*) You say that you object to your uniform; what uniform do you want?—I think if they gave us a frock coat, something similar to that of the assistant engineer, with nothing on it, it would do; more like a schoolmaster's coat, instead of the short jacket, because a stout man in a jacket, when he gets to any age, looks like a monkey cutting about on shore; it does not become him at all.

5750. A frock coat would be very inconvenient to you in the engine-room, would it not?—I should not wear it there. I should wear a canvas or duck suit.

5751. (*The Chairman.*) Could you pass the examination requisite to qualify you for an engineer?—I cannot speak French in the first place. I do not think I could work up to it at present, but if I had about three months' schooling I could pass for an engineer.

5752. (*Captain Commerell.*) Do you think that at the end of three months you could tell me what an elastic particle was?—Yes; I think I could work that up in three months.

5753. (*The Chairman.*) Supposing the Admiralty would admit men as engineers from the outside, would you be glad to pass the examination?—Yes; I would go to school every night and work up for the examination, and with the practical knowledge which I have I think I could manage to pass.

5754. How far have you gone in mathematics?—I know decimal fractions. I do not say that I am thoroughly competent in them now because I have no time to work them up. I tried for the Devonport yard, and lost by thirteen, when a boy, but there were a great many behind me.

5755. Where have you taken your schooling since then?—I have not taken any, because there is no chance of my ever doing anything on board ship.

5756. As it requires six years to enable a man to pass that examination with continuous study, do you think that you would be able to pass it in three months?—If a man gives his mind to a thing I think he can generally do it.

5757. Do not you suppose that the others give their minds to it?—But they are boys, and do not pay attention.

5758. Do you think that a good many do pay attention?—Yes, I dare say they do.

5759. If they cannot pass it under six years, do you still think that you could pass it in three months?—Some of them pass it in five years.

5760. What you ask for, 9s. a-day after ten years' service and a frock-coat, is putting you in the position of an engineer of the present day, and that after these men have passed very high examinations in all points, do you think that the Admiralty will grant that?—An assistant engineer has a chance of getting on, and he is below the junior officers.

5761. Would you like to be retained in the service the whole of your life, or would you like to be allowed to leave at the end of twenty years?—To leave it, as it is at present.

5762. Engineers have not got that chance?—No, but they can go on half-pay, and I have not that advantage. Would you allow me to give you this statement.

(The witness handed in a statement.)

5763. (Captain Commerell.) Does this statement which you have handed in embody your views alone, or the views of the whole of the engine-room artificers?—The views of the engine-room artificers as a body.

5764. How many?—About 200.

5765. (The Chairman.) Where did you ascertain their views?—From Portsmouth and Chatham. We asked them if we could forward this statement, and they have consented to it; the main things are an alteration of the mess arrangements, and a larger chest. I think that you will find that the statement contains all that we require.

5766. (Captain Commerell.) You mean, not what you require, but what you wish?—We have neither home nor habitation, and we are driven about like so many sheep; the petty officers are annoyed because we took better pay than they do; that is one of the things which makes them against us.

5767. (Captain Dowell.) Are you satisfied with the rank that you hold?—We wish to be removed from the chief petty officers altogether, and placed in a mess by ourselves.

(The witness withdrew.)

Mr. JAMES MELROSE, R.N., called and examined.

5780. (The Chairman.) Where are you now serving?—As engineer in the "Sheldrake."

5781. What is the "Sheldrake"?—A 60-horse power gunboat.

5782. Are you the engineer in charge of the "Sheldrake"?—I am in charge of her at present.

5783. What is your standing as an engineer?—The 80th January, 1868.

5784. When did you qualify for the rank of chief engineer?—About 1868, I think; I am not sure.

5785. About the time that you were promoted?—Yes.

5786. How long is it since you entered the service?—14 years last September.

5787. That was in 1861?—Yes.

5788. Where did you serve your time?—In the factory here, at Keyham.

5768. What, do you want—to be commissioned officers?—No, not at all.

5769. (Captain Commerell.) Why should you go above all the chief petty officers and men, who have served their country for many years?—We do not wish to be above them, but we wish to be placed out of the jurisdiction of the master-at-arms; we do not want to have anything to do with the lower deck.

5770. (Captain Dowell.) So long as you are chief petty officers, you do not want to be with them?—No, we want to be taken away from the chief petty officers altogether.

5771. (Captain Commerell.) Which would you rather have, relative rank with the chief petty officers, or to be taken off the lower deck and mess by yourselves and be more exclusively under the charge of the chief engineer?—That is what we want; we want to be placed under the exclusive directions of the chief engineer.

5772. I will not say "exclusive," because that would place you in an anomalous position in the ship, but as much as possible under the control of the chief engineer?—Yes; that is what we require. We are no one at present. We are spoken to as ordinary seamen, and must do just the same.

5773. (The Chairman.) Do you consider that to be the case in all ships?—Yes; the engineer said to me, "You are to stop down below and do the work of the engine-room and not to scrub the lower deck," but the lieutenant said I was to scrub the lower deck and was not to do the work in the engine-room; so that I did not know what to do. The engineer did not like me to scrub the the lower deck, and said it was not the place for me; if I was with the second-class stokers I could not keep my position.

5774. (Captain Dowell.) Have you been in the habit of working on board other ships?—Yes.

5775. Have you received extra pay for that?—Yes; 3s. per day.

5776. (The Chairman.) Was that in Gibraltar?—Yes.

5777. Did not that give you a good addition to your pay?—Yes, but it took extra money for washing.

5778. But you only have to do a day's work after all?—Yes; 10 hours a-day.

5779. It did not matter much whether you were at work in the "Pigeon" or in the "Pheasant," so why should you have more clothes to wash?—Because the clothes would not do for that job. If I go into another ship to work I must have a duck suit with me, and that increases the washing; a man will not wash your clothes for nothing, and you cannot wash them yourself.

5789. As an engineer boy?—Yes, as an engineer boy.

5790. Did you pass an educational test then?—On entry I did.

5791. Where did you pass your educational examination to qualify you for the rank of chief engineer?—At the dockyard here; in 1865, I think it was.

5792. What is your pay as engineer in charge of the "Sheldrake"?—10s. a-day, and 1s. a-day for being in charge of machinery.

5793. How long were you in the factory before you entered the service?—Five years.

5794. Are you aware of the practical training which the engineer students receive now?—I am fairly aware of it, not absolutely.

5795. Do you think that your practical work as an engineer boy was about the same or more than the

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engineer students get now?—I think it was about the same; I do not think that there is much, if any, difference.

5796. If any repairs are required in the "Sheldrake" now, do you work upon them yourself?—No.

5797. Who have you to do the repairs?—At present the machinery is in the hands of the factory contractors.

5798. At sea, I mean?—The new complement is an engineer and an engine-room artificer.

5799. Have you been to sea in her?—No, never.

5800. Have you been at sea in charge of engines?—No, never in charge. I have been in a gunboat in charge occasionally, while the engineer has been taken out.

5801. Not actually at sea?—It was on a station, but we were not sea-going; at that time we were laid up in harbour.

5802. When at sea, in the "Sheldrake," who will keep watch?—I should keep watch, and the other engineer and the engine-room artificer.

5803. What is her horse-power?—367 indicated.

5804. What is her nominal horse-power?—Sixty horses nominal.

5805. Have you an engine-room artificer appointed to her yet?—No, not yet.

5806. What trade would you like to have when he shall have been appointed?—A fitter; that is the most valuable man to have in a small ship like that.

5807. What ship were you in last?—The "Swiftsure."

5808. How long were you there?—Over five years altogether.

5809. Had you any engine-room artificers in her?—I had with me in the "Swiftsure" six altogether; four at one time during the whole commission.

5810. Were you the senior engineer in the ship?—Yes.

5811. What duty did the engine-room artificers do?—They did the duty of watching in the stokehold, driving the steam pinnace, and nearly all the mechanical duties of the engine-room.

5812. Do you think it is likely that you will get an engine-room artificer in the "Sheldrake" whom you could trust to work the engines?—Yes, I think it is very likely.

5813. That you say from your own experience of them?—Yes.

5814. Had those engine-room artificers in the "Swiftsure" a certificate that they were capable of managing engines?—I am not aware that they had.

5815. Are you aware that a man cannot be confirmed as an engine-room artificer unless he has that certificate?—I am aware that it is necessary for them to have a certificate before confirmation, but I am not aware whether those men were confirmed or not. I imagine that they were; some were I know, but I am not aware whether they all were.

5816. When you entered the service how long did you expect to be before you were made a chief engineer?—At the time that I entered the service, which was in 1861, the average time was 10½ years, and I naturally expected that I might get my promotion in about the same time.

5817. In what time are they getting their promotion now?—I do not know what the average time is, but as engineers they are 12 years; I think it is about 19 years.

5818. Under the present circumstances when do you expect to be made a chief engineer?—Under the present circumstances, and if things remain as they are now, I have no expectation of becoming a chief engineer. I am 300 down the list, and I do not know how I can be promoted before I arrive at the age for retirement.

5819. As that can hardly be considered a satisfactory state of things, what would you suggest to improve it with a view of obtaining quicker promotion?—I would suggest a material reduction in the list of engineers, and the substitution for them of engine-room artificers,

5820. How would you reduce the list of engineers?—By offering adequate retirement to the senior engineers.

5821. Over what age?—Over 35; because I do not consider that over that age a man can be qualified for the rank of chief engineer.

5822. Why not?—I think to be an efficient engineer of an ironclad of the present day, with all the duties that are now devolving upon the engineer, that a man must necessarily possess unimpaired activity and have the perfect use of all his senses, sight, hearing, and so on, smell and touch.

5823. Up to what age do you think they can retain those?—That depends upon the life he has led.

5824. Taking the average life of an engineer, by which we are only able to judge, up to what age do you think he is qualified?—Not over 40, if he has been twenty years in the service.

5825. Would you only keep him for five years as a chief engineer?—Five years would elapse between 35 and 40, and that time would not have to be served as an engineer, with all the discomforts which he has to put up with in that rank; he would not have to sleep in a hammock, and he would have more comfort altogether as a chief engineer. Under those circumstances, I think that his capability of carrying out the duties of a chief engineer might continue to the age of 50, but not over 50; the changed circumstances would make a difference so far as activity and physical vigour are concerned.

5826. Do you consider that it is more healthy sleeping in a cabin than in a hammock?—I do not. I do not think it is more healthy; and, as far as I am concerned myself, I should enjoy as good health in a hammock as in a cabin. I am not like the generality of engineers; the majority of engineers senior to me at present are not what I consider men of unimpaired activity and in perfect possession of all their senses; but I consider that the duties of a young chief engineer of an ironclad are so manifold that he needs to be almost ubiquitous; he has to be capable of very rapid locomotion from one end of the ship to the other, and perhaps he has to go in and out of double bottoms and boilers, and so on. I think that he should be, at any rate on his promotion to the rank of chief engineer, very active.

5827. A man of unusually good qualities, both physically and mentally, to be chief engineer of a large ship?—Yes, at the present day, and more especially for the requirements of the future.

5828. Should you like to see the promotion from engineer to chief engineer by selection?—I would not like to see it altogether originated.

5829. How else could you ensure what you desire. If a man only came up to the top of the list by seniority, how could you ensure, even if he were a man of good character, that he was up to the very important duties he had to perform, and possessed the necessary physical and mental qualities for them?—I do not think that they ever will, so long as the list necessitates them continuing for such a time in the service as they do at present. If they reached the top of the list, prior to reaching the age of 35, it might naturally be expected that those coming on would be possessed of all those requirements necessary to carry out the duties properly.

5830. You think it likely that all would?—Not all; certainly not; but I think it is probable that those who would reach the top of the list would be perfectly qualified. Those who were physically unfit would probably leave the service before that time.

5831. Is there not a large step between being physically unfit and obliged to leave the service, and having all the capabilities which may be necessary in a ship?—What might invalidate a man from performing his duty as chief engineer would not be sufficient to invalid him from the service.

5832. What would you do with that man?—I would offer him retirement.

5833. Before the age of 35?—No, not before; in no case will it ever be, without exception, that some

would arrive at the top of the list without loss of qualifications.

5834. You would not like to see selection the rule?—I do not think it would be advisable.

5835. Not to pick out the best man?—It is so difficult to get at the best and most deserving man.

5836. Do not you think that a man of great merit and zeal and talent would show what he was worth in the course of ten years?—Very likely he would; but at the same time influence would probably be exerted by others who did not possess those qualifications. Again, in many instances the most meritorious have not an opportunity of displaying their qualifications; it is generally a matter of opportunity, and some never have that opportunity at all.

5837. What retirement would you suggest offering to all engineers over 35 years of age as an inducement for them to leave the service?—For all engineers over 35 years of age having, which they would have, from 15 to 20 years' service, I do not think that 6*d.* a-day would be considered too much to ask for as a fair recompence for their services and disappointment.

5838. What do you call 6*d.* a-day?—6*d.* a-day for each year's service.

5839. Service at sea?—Acting service, counting it in the ordinary way.

5840. Counting harbour service as well?—They ought not to count that, though few have got any to speak of.

5841. Would you make it compulsory for all engineers over 35 years of age to retire, with the the object of clearing the list?—It would not be fair to make their retirement compulsory at the age of 35.

5842. Supposing that the position of the engineers is considerably improved, would they not like to remain in the service rather than retire?—If they were getting a much higher rate of pay than they could get by retirement, probably many would prefer to remain; some, but not a great many.

5843. Have you ever thought how many men over 35 years of age would accept retirement at the rate of 6*d.* a-day for each year's service?—I should think that quite 200 would be willing to go for that.

5844. What proportion do you think the engineers should bear to the senior ranks in order to make a good flow of promotion?—Not more than double.

5845. Do you know what proportion they bear at present?—There are 172 to 800.

5846. What would you suggest with regard to the chief engineers by way of improving their promotion?—I would suggest compulsory retirement at 50 instead of 55 years of age as at present, and an increase of the list of chief engineers by appointing them to all ships of an equivalent horse-power to what formerly was 200 horse-power.

5847. What indicated horse-power would you lay down?—600 would be rather under the mark, I think; 650, I should say, would be a fair equivalent horse-power.

5848. If a chief engineer were appointed to a small ship like that, do you think he would like to keep watch in the engine-room?—It is not necessary, if they give him three engine-room artificers.

5849. The "Sheldrake" would not come under that?—No, she would remain with an engineer in charge.

5850. Have you thought how many it would increase the list of chief engineers, supposing they were appointed to ships of 650 indicated horse-power?—I have made no calculation. I have seen it, but I do not remember how many it was, although I know it was a considerable number.

5851. Have you been to sea with two chief engineers?—Yes.

5852. Where?—In the "Warrior."

5853. Is that a good plan?—I do not think it is.

5854. Did it work?—No, not in that ship. Mr. Buchan was the chief engineer, and Mr. Glaspole was the second chief engineer.

5855. Do you think the same difficulty would arise

if the senior chief engineer had a different title, and, of course, higher pay for his longer service?—That would depend upon the character of the man; in the case of the "Warrior," I think it was rather exceptional; but I should think it was quite likely that the same jealousy might exist if the ranks were assimilated, although the titles were different.

5856. You say that you have not been thrown much in contact with the engineer students in the dockyard?—No.

5857. Have you any suggestion to offer to the Committee as to what you think the pay and position of the engineers should be?—I think that it is necessary that it should be materially improved.

5858. In what way?—By making the pay progressive from the time of entry.

5859. Up to what maximum as an engineer?—Up to 14*s.* a-day, I should think, as the least.

5860. To reach that at the age of 35?—Yes, after 14 or 15 years' service.

5861. If promotion to the rank of chief engineer were much expedited, that in itself would be a great benefit to the class, would it not?—If the rate of promotion to chief engineer were anything like it was at the time I joined the service it would be quite as much benefit, pecuniarily, as progressive rise of pay.

5862. Besides that, they get the benefit of a cabin and the ward-room mess earlier?—Yes, and a higher rate of widow's pension for those who have wives.

5863. What would you suggest that the pay on entry should be; would you rather have it remain as it is now on entry and progress considerably higher, or higher on entry and progress slowly?—It should be higher on entry than it is at present; it is now 6*s.* a-day on entry, and I think it might be increased to at least 7*s.* 6*d.* a-day.

5864. (*Captain Dowell.*) Do you think that the officers are really worth more than 6*s.* a-day on first entry?—I think they are worth considerably more than 7*s.* 6*d.* a-day, if you put a market value upon their qualifications and abilities.

5865. (*The Chairman.*) Do you think, considering the class from which the engineer students come, that they could expect at the age of 21, after having been educated entirely at the government expense, to receive more than 6*s.* a-day?—Yes, I think they could; they could demand a higher value than that in the world.

5866. As what?—As surveyors, draughtsmen, chief draughtsmen, overseers and assistant managers.

5867. Do you think anybody would give men of no experience whatever the position of overseer, men whose character and qualifications had not been tested; is it the case in any other profession in the world?—I think it is in the outside world.

5868. Then why do men struggle to enter as engineer students in the way they do, when they know what they have got before them?—Because I consider that an engineer studentship is of more value than any scholarship I know of offered to youths of that age in the country; it is the value of the weekly wages which offers a great inducement for them to become students.

5869. Do not you think that that in itself is a great reward for their work; getting this education and this pay, which you say is of such value to them, for they are struggling up and their parents cannot support them?—Yes; I consider that it is far more than a reward for their services, because their services are never of that value to the government at that time.

5870. Then why give them a higher reward still?—Not during their studentship. I would not give them any pay at all during their studentship, so as to ensure the enlistment of a superior class of youths than the present.

5871. Is that the only way in which a superior class could be got; could it not be got if the Admiralty nominated the candidates?—It might be got if the nominations were given solely by the Admiralty. It

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would be a better plan to combine Admiralty nomination with a material reduction of their pay.

5872. Why do you wish to reduce their pay at one time, instead of helping them when their pay is very small, and increase it at another; why make so great a jump between providing for themselves until they actually go to sea, and when they have to learn their work at sea, and cannot be but of very little use, at all events?—I do not say that they have to learn their work at sea. I am under the impression that they have learnt it before coming to sea, that is as far as their professional training compared with the professional training of any other engineer up to that period of his life is concerned.

5873. What professional training?—His scientific acquirements and practical knowledge.

5874. Is the scientific knowledge of any use to him during the first year or two at sea?—It is of use to him at any time.

5875. Are they of use to the service for the first two years, until they are fit to take charge of the engines?—I think they are of use, certainly.

5876. When keeping watch in the stokehold?—Then they are deputed to do duty which would be, and could be, as well performed by an ordinary skilled mechanic.

5877. What duty would you put him to when he first goes to sea?—I would apply him only to duties which would be within his own proper sphere. Controlling and directing the duties in operation in the engine-room.

5878. Is he likely to know how to control and how to direct them before he has had any experience in them himself?—Not efficiently, but he would go to sea with a certain amount of knowledge, and his knowledge and his power would be by time matured.

5879. Do you think that for the first year a young engineer is at sea that he is of such value to the service as to require his pay to be increased in the first instance, notwithstanding the high education which the government have given him at their own expense; do not you think that it would be more advisable to reserve the pay that engineers earn until they have been a few years at sea and have become of great value in the service?—I consider that when an engineer has completed his training as a student, his abilities are from that time undergoing progressive development from the moment of his entry into the service, and although the actual service which he renders to the government during the first two years of his time at sea may not be very valuable, or be represented by a monetary value of 6s. or 7s. a-day, still, in view of his abilities progressing and developing themselves, I think he is entitled to demand a higher remuneration than 6s. a-day, at any rate, having in view that with his qualifications and abilities he might go to the outside world and obtain a much higher rate of pay immediately on the completion of his studentship.

5880. When you say "entitled to demand," do you think that a man is entitled to demand more than he engaged to receive and to work for?—Of course, I do not think that a man is entitled to demand more than he engaged to receive.

5881. Do you think that young engineers marry early?—Yes, unfortunately, they do; there can be no question about that.

5882. And you do not think it is a good thing for the service, I suppose?—It is a bad thing for the service.

5883. Do not you think that if you increase their pay, there would be a greater tendency to marry?—No, I do not.

5884. Because if you increase their pay it would enable them to support a wife earlier?—I think if during their studentship they were placed under control, and had not the same amount of pay given to them which is given to them at present, that it would act as a preventive against their getting married. During the time of their studentship they contract

these marriages, or engagements which result in marriages, shortly after their entering the service.

5885. You do not think that an increase of pay on first entry would induce them to marry?—I do not think it would encourage marriage; if I thought that, I would advocate a reduction of their pay, because I consider it is a necessity to prevent early marriages if possible, amongst engineers.

5886. In the "Swiftsure" what complement of engineers had you?—Five.

5887. And what engine-room artificers?—Four.

5888. What complement would you recommend on a reduction?—In the "Swiftsure" one chief engineer, two or three engineers, and seven engine-room artificers.

5889. Who would keep watch in the engine-room?—The engine-room artificers.

5890. Do you think that the engine-room artificers would be qualified to take charge of the engine-room in a large ship?—I feel certain that they are, because I have had experience of their abilities.

5891. If the scientific knowledge of an engineer be so very important, as enabling him to take charge of engines, do you think then that an engine-room artificer would be quite as capable of doing his work without the same education, and so on?—I do not consider that the duties of an engineer at the present day, should be confined to engine-driving, or to doing the ordinary manipulation of a workman.

5892. What are his duties?—I do not speak of what they are, but of what they should be.

5893. Then what should they be?—I think the requirements of an engineer—

5894. The "duties," we will say?—The controlling and direction of the whole of the manifold duties and operations necessary to be performed on a man-of-war.

5895. Does not that rest with the chief engineer?—It does.

5896. What duty does an engineer in a ship like the "Swiftsure" perform?—Assist the chief engineer.

5897. Do as he is told?—Assist him in directing and controlling the men under his charge, and in the carrying out and completion of the work that has to be performed.

5898. In the repairs and so on?—Just so; the preservation of the machinery.

5899. There are not a great many repairs going on when at sea under steam?—No; not many as a rule.

5900. You do not consider that keeping watch in the engine-room is one of the important duties of an engineer?—It is one of the duties that might be done by an engine-room artificer of ordinary intelligence; a skilled mechanic.

5901. Do you consider that an engineer has a more important duty than keeping watch at night in charge of the engines of a large ship, or that he can have a more important duty?—I recognise the importance of the duty of keeping a watch; but I consider that that watch might be as well kept by an engine-room artificer as by an engineer officer of the present day; at the same time, I would have an engineer officer supervising the work both in watch-keeping and in all other operations that were being performed. I was senior engineer, but I never kept a watch, although I visited the engine-room repeatedly both night and day. They never performed any operations of getting up steam without my being in the engine-room, although there was an engineer always on watch; still, I think I could have done just as well with an engine-room artificer. I have had to do those duties with engine-room artificers, so that I know what their capabilities are.

5902. (Captain Dowell.) Have you any suggestions to offer to the Committee with regard to the engineers' mess?—I should like to see the engineers' mess abolished. I should like to see the engineers, after five years' service, made members of the ward-room mess; but I can hardly think it would be judicious (although I should like to see it) to abolish it alto-

gether for the present, or until we get a better class of men to enter the service as engineer students.

5903. (*Captain Commerell.*) Do you think altogether that the engine-room artificers whom we now get in the service are a thoroughly trustworthy and satisfactory set of men?—I am aware that a great many are not, but I think as a body they are.

5904. What trade do you think gives us now the best engine-room artificers?—The fitters.

5905. Do you think that the ordinary smith artificers whom we get now, and who may have been ships' blacksmiths, are a satisfactory class to enter. I do not refer to enginesmiths, but the ordinary blacksmiths?—No, I do not.

5906. Do you think that the engineers as a body, taking into consideration the different ages at which they attain to their various ranks, would be satisfied if their pay were assimilated to that of officers in other branches of the service?—If they were assimilated to the medical branch they would be satisfied.

5907. Why do you select the medical branch, taking into consideration that the medical branch is the highest paid branch in the service; they are men who have entered the service much later, and have at a great expense provided for their own education; whereas the engineers have entered the service young, and their expensive education has been provided for them by the government?—Because the medical branch, I take it, is the only other profession in the service to which we could assimilate them, both on shore and afloat. I think that the engineering profession on shore can and does reach an equal status in society to the medical profession on shore; and I think that the abilities possessed by professional engineers on shore are quite equal to the abilities possessed by the medical profession on shore; and, although the medical officers coming into the service do certainly pay the expenses of their own education, while on the other hand the engineer officers do not, yet still, in view of the requirements of the future engineers of the service, if the pay of the engineer students was materially reduced or taken away altogether, the two officers would be placed on an equal footing in that respect.

5908. (*The Chairman.*) Would you make them pay for the education which they receive?—If, as students, they received no pay, they would have to support themselves during the period of their studentship.

5909. But would that put them on an equality with medical students who, besides having to support themselves, have to pay very highly for their education?—I do not think all do. In many cases in Scotland, and at the Irish universities, a medical student can get through his studentship at a cost of something like £50 or £60 a-year.

(*Captain Dowell.*) Only when they have obtained a scholarship.

5910. (*Captain Commerell.*) You think then that the engineers, as a body in the service, would not be satisfied if they received the same relative pay and half-pay (taking into consideration the circumstances of the case) as the executive branch; the paymasters' branch and the navigating lieutenants' branch?—At the same ages, I think if they received the same pay they might probably be satisfied.

5911. I do not say the same ages, but taking into consideration the difference of age, I should consider that an engineer who was not promoted until he was 40 years of age deserved the relative pay then of a lieutenant who was not promoted at 30; bearing in mind the various differences of age between the two ranks, do you think they would be satisfied?—I do not think that an engineer would be satisfied with a corresponding rate of pay to a lieutenant at the same age.

5912. For what reason?—Because a lieutenant's pay stops at 10s. a-day, and that can never be considered by the majority of engineers as an equivalent, or a sufficient money value, for their services after many years' service. Many lieutenants, or perhaps the majority, would be willing to serve without any

pay at all, but that would never occur in the case of an engineer. An engineer must necessarily have pay, as he has not the opportunity of gaining the distinction and honour that a lieutenant has probably.

5913. I speak more with respect to the paymasters' branch and the navigating branch; would they be satisfied in that case, do you think?—They would be satisfied if they were assimilated to the navigating branch. I think that they would be altogether satisfied, because then at a very early age they would be promoted to the rank of chief engineer. Navigating officers are promoted to the rank of navigating lieutenants under the age of 30 even now, although the promotion is not so quick now as it was formerly.

5914. You say that you would not do away with the engineers' mess at present?—No, I think not; but I would make the senior engineers members of the ward-room mess.

5915. After five years' service as engineers?—Yes, after five years service I would give them the option.

5916. The same as the assistant paymasters?—Yes, the same as the assistant paymasters.

5917. And I suppose take turns in cabin accommodation with those of a similar rank, according to seniority?—Yes, I should like to see them take their chance with others of equal rank in the service.

5918. In the ships that you have served, have your engine-room artificers had the opportunity of obtaining much extra pay for working on board other ships?—No, very few opportunities, only on two occasions I think, one engine-room artificer on each occasion was employed about other duties.

5919. It is an exception?—It is an exception certainly.

5920. (*Mr. Wright.*) Do you know what is the feeling generally amongst the engineers and assistant engineers about having to do manual work on board ship?—The feeling amongst them is, that it is very offensive to them to have to do it.

5921. Is it considered derogatory to their position; of course it is offensive to anybody to have to work hard?—Yes, it is.

5922. How do you propose to get the necessary work done on board ship?—By means of the engine-room artificers; by the substitution of engine-room artificers for engineers, in fact.

5923. In your present ship you and the other engineers mess in a general mess, I think?—Yes.

5924. That is an arrangement which is popular amongst engineers, is it not?—With the majority of the engineers I should certainly think it was; but I am quite aware that there exists a large number of engineers who would never be desirous of becoming ward-room officers.

5925. For what reason?—While I take it that there are two or three classes of engineers, they would probably object to becoming ward-room officers; first, there is the married engineer, who, as a matter of expense, could not well afford it on the present rate of pay; second, there are the engineers who would apprehend that they would not be able to conduct themselves in the ward-room in the same way as they are able to do in many cases in the engineers' mess; and thirdly, there is a class of engineers who would feel out of their element altogether in the ward-room mess, and they would for that reason prefer associating with engineers only; but I think the present more junior engineers and the engineers of the future at any rate would prefer always becoming ward-room officers in small or in large ships.

5926. (*Captain Dowell.*) Where were your engine-room artificers mustered in the "Swiftsure"?—At divisions they stood with the men at divisions.

5927. With the stokers?—Yes, in front of them.

5928. Who inspected the stokers?—I inspected the stokers.

5929. You kept the division list?—Yes.

5930. There was no lieutenant?—No.

5931. When you entered the service did you expect to have to do manual work, was it not an understood thing?—At the time I entered the service the acquire-

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ments of engineers were not, as a rule, what they are now; no educational certificate was required for a chief engineer, and it was not necessary in those times to be possessed of the high scientific attainments that are required now as chief engineer.

5982. Do you think that those high qualifications unfit men for the ordinary manual work which they have to do. I imagine it is only fitting slides, and so on?—They might direct it, but I think it is demoralizing to devote talent of that description to the performance of duties and operations that might as well be performed by ordinary workmen or skilled mechanics.

5983. (*The Chairman.*) You say that it is the high course of education which they have to undergo, which you think ought to exempt them from manual labour?—I do not think it is entitled to exempt them from the performance of those duties.

(*The witness withdrew.*)

JOHN BESLY, Esq., called and examined.

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5936. (*The Chairman.*) You are secretary to the Admiral-Superintendent, of this dockyard, I believe?—I am.

5937. Who receives the applications for the entry of engineer students at this dockyard?—The Admiral-Superintendent.

5938. Do you consider by the regulations that he is empowered to refuse the application of anybody unless they are a bad character?—No, he accepts any application, with the proviso that the boy is of respectable character.

5939. Have you ever had occasion to refer to the referees as to character?—Yes, on some occasions we have had to do so.

5940. Do you do so in the case of the successful candidates as a rule, or not?—It is done in this way: the application is made before the candidate is examined by the chief engineer or the medical officer of the dockyard; he is not allowed to proceed to the examination unless they are satisfied that he is of respectable character.

5941. Are they looked at by the medical officer of the yard and the chief engineer before or after they go into competition?—Before they go into competition.

5942. Not only the successful ones, but the whole of them are examined?—Yes, the whole of them.

5943. Do you occasionally refer to the referees in order to ascertain whether the references are correct, if you suppose there should be any reason for doubting them?—Yes.

5944. Do you always see the candidates?—Yes, the whole of them.

5945. When they put their names down?—When they bring their nomination papers.

5946. Do you suppose it is understood or intended by the Admiralty that a selection should be made, or that all should be admitted indiscriminately?—By the present regulations they all should be admitted indiscriminately.

5947. As a rule are the candidates generally from families residing near the dockyard?—Yes, and within fifteen or twenty miles round.

5948. Do you get any candidates from the interior of the country, north?—Yes, occasionally.

5949. Are there any down upon this list from the north of England?—No, none recently; the reason is that, under the present regulations, they send the applications to London.

5950. As well?—Yes, as well; by the present regulations they make application to the Civil Service Commissioners.

5951. When did the last examination take place?—In June or July last.

5952. Since July have any applicants come forward?—No, none.

5934. That would only refer to the highly educated men, who have passed the examinations during these last few years, and not to those who have not been through that high course; you would not wish a man to have neither education nor manual skill?—No, hardly that; although every engineer has not passed a high educational test in the service, still those in the service at present, I think, are only right in imagining that they are possessed of certain qualifications, although they may not reach the acquirements of the present engineers and future engineers, still they must have acquired some scientific attainments and some professional knowledge other than they possessed when entering the service, even supposing they entered the service as ordinary skilled mechanics.

5935. They would be more useful than when they entered?—Yes, more useful to the service than when they first entered, undoubtedly.

5953. Why is that?—Because they have up to the 1st of May, 1876, to make application.

5954. As a rule, do you get your applications shortly before the examination, or do they run over three or four months?—They run over three or four months generally.

5955. Are you aware whether these candidates are educated at any particular schools?—There are special schools in which they advertise that they will educate boys for engineer students.

5956. Does it appear to you that the sons of artificers in the dockyard are successful in a large proportion?—No, the contrary; where boys have been crammed at special schools they are more successful than those educated at common work schools.

5957. Would you consider it desirable, if the Admiralty wish to nominate the candidates instead of selecting them indiscriminately, that the nomination should be made at the Admiralty or at the dockyard?—At the Admiralty.

5958. Applications being still taken in at the Admiral-Superintendent's office?—Yes, applications being received here as at present.

5959. Have you been thrown in contact with the engineer students much after they enter?—No.

5960. Then I suppose you could not give any evidence about their behaviour?—If any case of insubordination occurred during working hours they have been punished under the recent directions.

5961. How long has this indiscriminate entry of candidates been carried on?—Ever since the first starting of the entries in the year 1863.

5962. (*Captain Commerell.*) Are you in favour of open competition without selection as now, or would you prefer to see nomination?—I should prefer to see nomination, looking at the class of men who come forward as candidates.

5963. You think that, as it is at present, it is a bar to young men of respectable parentage coming forward?—I do.

5964. Is there any other mode which you could suggest to bring forward young men of a little better class, the sons of half-pay officers, for instance?—The sons of half-pay officers? It might be limited to the sons of civil officers.

5965. The sons of gentlemen with limited incomes?—Yes, quite so.

5966. (*Captain Dowell.*) Would you limit it; if a millionaire liked to put his son in, would you object?—Not at all. I have known men come to me who have said, after hearing who these engineer students were, that they should not think of putting their sons in. I have had half-pay officers come to me, and, having explained to them what the nature of the appointment was,

they have given it up as not being a fitting position in which to place their sons. I have known the son of a staff commander compete, and he has been plucked; and I have known the son of a foreman in the dockyard compete, and he has been successful; those are the only two cases of that sort which I know. A gentleman applied to me on behalf of his son, and when I told him what it was he said he could not think of letting his son go in amongst such

a lot of persons to compete with them. The son of a dockyard labourer, who had been educated at a charity school in the neighbourhood, came out number one in the examination; his father is a labourer in the dockyard, and the son had been educated for 6d. a-week, or something of that sort. It seems to me that a poor gentleman cannot afford to give his son the education which some of the charity schools now give to the sons of poor men.

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(The witness withdrew.)

CAPTAIN RADULPHUS BRYCE OLDFIELD, R.N., C.B., A.D.C., called and examined.

5967. (The Chairman.) What position do you hold at present?—I am captain of the steam reserve at Devonport.

5968. Have you been here long?—For seven months.

5969. Before that time what ships did you command?—The "Warrior," the "Royal Alfred," and the "Achilles" for two years' service in the coast guard or first reserve.

5970. What staff of engineers had you in the last ship which you commanded, the "Warrior"?—The complement of those vessels was irregular; and those I had did not form the complement of the ship.

5971. What had you?—One chief engineer, four engineers, belonging to the ship, three engineers and two assistant engineers lent.

5972. Engineers and assistants?—Yes, altogether.

5973. Is that the complement that you had when you went to sea?—When I went to sea in the "Achilles" I had that complement.

5974. Did you find that complement sufficient?—For the service we were on, yes; it was special service.

5975. Were you satisfied with the men whom you had as engine-room artificers?—Yes.

5976. Do you remember what trades they were?—No.

5977. Did they do duty in the stokehold, keeping watch when the ship was under way?—Yes.

5978. Have you served in a steamship without any engine-room artificers?—Yes.

5979. Do you think it an advantage having engine-room artificers added to the complement of a ship?—Yes.

5980. As far as you have seen have they done their work well, as good workmen?—Yes, very; and they have been well spoken of by the chief engineer.

5981. Do you think that they are equal or superior as workmen to the junior engineers?—They are not equal to the junior engineers of five years back; but I have not studied the question sufficiently since to be able to give an opinion.

5982. You mean that you have had no experience of the engineer students who are now entering the service?—Quite so.

5983. You have a high opinion of the engineers who entered the service about eight or ten years ago?—Yes, very, having served on stations on which the ship had to depend entirely upon her own resources from year's end to year's end; I have found them efficient in all respects to keep the ship in good repair.

5984. You have found the engineers a very efficient body of men for repairing the engines?—Yes.

5985. Which is a matter of great importance in the efficiency of a ship?—Yes, very. I speak of my experience on the east coast of Africa, and in the Pacific.

5986. In those cases of which you speak, you had no special engine-room artificers, had you?—No, none at all. I would not be certain whether we had in the "Malacca."

5987. They were not introduced till 1868, and the "Malacca" went out in 1865?—Quite so.

5988. The engineers being so valuable a body of men, have you considered whether their promotion, position, and pay are satisfactory as they now stand?—Although their promotion is slow I do not consider that it is more so than that of other grades in the different walks of life. In the service we look only to ourselves and not elsewhere. Take five young men of the same age, and let them enter a profession; one will rise to a good position in it, and the other four attain by no means the position they anticipated when starting in life. Such is the world. Engineers are not an exception to the rule; on what grounds should they be? Promotion must necessarily be irregular in a service like ours; augmentation and reduction being so much governed by passing events of the day.

5989. When the great body of these engineers entered the service, it was the fact that an engineer attained the rank of chief engineer in from 8 to 12 years' time; now, there are few reaching it until after 19 or 20 years' service, and a large number of them have no hope whatever of being promoted to that rank. Which state of things do you think is the better of the two, that is to say, when rank as a chief engineer is reached in from 8 to 12 years, or, as it is now, in from 19 to 20 years?—Undoubtedly, when a man was promoted to the rank of chief engineer in from 8 to 12 years, in that case, I think, it was both better for themselves and for the service.

5990. Do not you think that in establishing a system in any branch of the service, we must look to the benefit of the service instead of making a comparison with other classes on shore, unless we are compelled to do so?—But, in making an inquiry into what is considered by the officers, whose interest we are inquiring into as a grievance, a comparison should be made which should show clearly whether their case is a case of hardship, as it is considered by the officers, or not.

5991. Do you think it is a fact that, if these engineers were permitted to leave the service at once, that a number of them could obtain employment in the merchant service at a higher rate of pay than they get now?—No doubt some few of them would; but the majority, I think, would not.

5992. Do you, or not, think it desirable that any change should be made in the engineers that would expedite their promotion to the rank of chief engineer?—I think it would be well, under restriction, to offer inducements to a very few senior, and some few others, to retire; but the means I should suggest to meet the present slow rate of promotion, would be to compensate the officers more for length of service than at present is the case.

5993. Do you remember what trades the engine-room artificers in the "Warrior" were?—No, that I cannot tell you.

5994. What complement would you suggest for a ship like the "Warrior"; if you were drawing up the sea complement for her, what should you propose?—One chief engineer, six engineers, and five engine-room artificers. I have had but very little

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experience of the capabilities or capacity of engine-room artificers, and I must therefore answer reservedly.

5995. Would you desire, under any circumstances, to substitute engine-room artificers for engineers?—Yes but with reservation; that is to say, not until I could speak from experience of their capacity.

5996. Had you any trouble with your engine-room artificers in the "Achilles"?—No, none whatever.

5997. Do you think that we are likely to get good men for the pay which we at present offer?—I think we can; my short experience here gives me reason to speak with confidence upon that.

5998. Can you inform the Committee whether there are any artificers now applying for entry?—None at this moment at this port.

5999. Do you receive a communication from the other ports as to the numbers that are available?—No. Shortly after my arrival here, not having any on draught, I informed the captain of the steam reserve, Captain Waddilove, of the fact.

6000. Did he reply that he had any available?—No; he had none.

6001. Have you any suggestion to offer to the Committee as to any change that you would recommend in the engineer class with regard to their pay and position?—As regards the engineers' pay, it should be increased in accordance with seniority and general service. As regards position, engineers of certain standing should mess in the ward-room. When the number of junior engineers did not render it inconvenient, they should be gun-room officers. In small corvettes, &c., unreserved abolition of the engineers' messes is a question for future consideration. The numbers at present considered necessary for the general working of engines, and the disparity of years between them, and the members of the gun-room mess, at present raises the question, Is it expedient? When the numbers lessen, which is in contemplation, and the disparity of years is less, I should advocate the one mess, and not two, as at present. With reference to their pay, I think that their length of service in the grade of engineers should be taken into consideration, as, in my opinion, promotion is ruled by the exigencies of the service, and that, therefore, their case cannot be well met in any other way than by increase of pay. This list (*handing the same to the Chairman*) shows the supply of artificers during the last twelve months; but I do not know enough of the class to be able to give any definite opinion about the men.

6002. Have you any suggestions to offer with regard to an improvement in the condition of the engine-room artificers that would enable us to ensure getting and retaining a good class of men?—One great cause of complaint on the part of the engine-room artificers is the discomfort of their lives on board ship. I think that great care should be taken that as good a mess-place for them as the ship, all things considered, can provide, should be fitted; and that the instructions with relation to the chief petty officers being exempted from the work of cleaning their mess-place should be also applied. The discomfort of which they complain most, I think for the most part, is such as must naturally attend a sea life, namely, the rule of the police and officers in connection with that force. Their clothes' chest, or space for containing clothes, should be of the same size as that of the master-at-arms; it is now somewhat smaller.

6003. Do you think that their pay is sufficient, or would you like to see it progress with length of service?—Their pay on entry is, in my opinion, as much as should be awarded to them, because in awarding that pay, the general pay and allowances of the service must be considered. From the information which I have been enabled to gather, I think that their present rate of pay is a very fair one, as it is as high as that which men of their own class commence on, elsewhere on shore.

6004. Do not you think that if we wish to induce them to go through what they call the hardships of

a sea life, and to serve away from home, we must give them something more than that which they would receive on shore?—If that were to be the rule, I think it would also be expedient to raise the pay of other classes. Their own officers would be inadequately paid in comparison with them, and if such a course were adopted, no doubt comparison and heart-burning would soon present itself amongst others. Their pay at present, as I have already mentioned, is, I think, as high as that which they could obtain on shore, while at the same time, in the service, they are receiving board and lodging, which I regard as an addition of at least 1s. 6d. a-day.

6005. Do you consider it important that we should get good artificers for the navy?—Yes, very.

6006. And do you think that the question of money should be allowed to stand in the way of our doing so?—Yes, if it establishes a rule and principle contrary to those which have hitherto governed the service.

6007. If then we fail to get good engine-room artificers for the pay now offered, what are we to do?—To endeavour to establish a system of educating them for ourselves.

6008. Would not that be a far more expensive plan, and should not we have to pay a great deal more if we educated them ourselves?—It might be more expensive, but we should attain our end, as we do now, by educating the men for most branches of the service.

6009. In what different position would these engine-room artificers be when we had educated them ourselves (as we do indeed in our dockyards), instead of their being educated in the private trade?—None socially, as they would spring from the same class in life; but, having been educated in connection with officers and men in the service, they would, I think, better realise the advantage of that 5s. a-day in Her Majesty's service, with the prospect of a pension. That 5s. a-day, with pension in prospective, is a much higher wage than 5s. a-day without that prospect; and 5s. a-day, without any prospect of a pension, is the wage upon which many of them commence in private factories. I think they would soon find out that a sea life did not necessarily carry with it all the miseries they now seem to anticipate that it does.

6010. Do you consider that 5s. a-day is all that a good man could earn after 15 years' service in the factory or in the private trade?—No; nor is it all that I would propose as his wage while serving Her Majesty.

6011. Would you increase their pay, then, after a term of service?—Certainly; according to a man's length of service and worth.

6012. To what would you let them rise at the end of 10 years' good service?—To 7s. 6d. a day.

6013. How do you like their uniform?—I think that on first entry their present uniform is appropriate, but subsequently, after they have proved their adaptability to the life which they have chosen, I see no objection to their having a similar uniform to that of the master-at-arms; that is to say, a similar coat to that worn by the master-at-arms and others of the same rating.

6014. Have you ever considered what should be the relative proportion of the different trades that we ought to have among the engine-room artificers?—I have not.

6015. (*Captain Dowell.*) What pension do you think they ought to have?—I would give them the same pension as that which is awarded to warrant officers, namely £4 a year for every years' service.

6016. (*Captain Commerell.*) Provided a class of engine-room artificers can be found in every way competent to take charge of an engine-room watch, what objection have you to their taking the place of the engineers?—Although practically competent to drive and attend the bearings and the work generally of the engine-room and stokehold, I certainly do not advocate that they should hold the responsible position of having charge of engines beyond a certain

power. The responsibility of, and knowledge required to work the engines of a large ship would be, I think, beyond the capacity and education of men educated as engine-room artificers would be.

6017. Do your objections hold good with regard to the stokehold watch?—No, I think that an engine-room artificer would prove himself quite competent to take charge of a stokehold watch.

6018. In all classes of ships?—I would not say that it was expedient to give an engine-room artificer charge of the stokehold under all circumstances; although there are many of them who would be thoroughly competent and trustworthy, it would not be so in all cases, and I think that the supervision of an engineer would be occasionally required.

6019. Do not you consider that for 7s. 6d. a-day pay, and an adequate pension, we might ensure getting a class of engine-room artificers that would at all times be capable of taking charge of the stokehold in large ships, and of the engine room in smaller ones?—No doubt there are many would be quite competent to do so, especially amongst the seniors, and those who had risen to a higher scale of pay.

6020. Are you aware that year by year the age of the engineers entitled to promotion to the rank of chief engineer is steadily progressing?—Yes.

6021. Do not you consider that it must be very heart-breaking for meritorious officers of from 38 to 42 years of age, to see no chance of attaining the rank of chief engineer, and year by year observing officers of other grades in the service passing over their heads?—Yes, very; but it would not be felt, except in a very minor degree, if their length of credit-

able service were compensated for by an increase of pay in proportion to it.

6022. You are no doubt aware, that at present chief engineers do not count their junior time until they have 11 years' service as chief; the consequence is, that many officers not attaining that rank until late in life, are never able to count their junior time; under those circumstances what would you propose?—I think it is very hard indeed, but at the same time not very difficult to meet. I am of opinion that all time served creditably should count towards pension, irrespective of promotion or rank.

6023. Have you gone at all into the question of the source from which we at present draw our engineer officers, and, if so, do you consider it satisfactory?—I have made inquiry into the question, but I have had no experience of it; I should say that it was satisfactory, but with this exception, that the training I am informed, is not quite what it should be, and the impression is, I gather, that on their return from college, some practical training is requisite before they receive appointments afloat as engineers in commissioned ships.

6024. Would you recommend that engineer students should be entered as at present by open competition, or by competition on nomination by the Board of Admiralty?—Certainly by competition after nomination by the Board of Admiralty.

6025. We have heard from several witnesses in the engineering profession, that they consider the students should receive little or no pay during the first three years of their educational training, is that your opinion?—That is a question to which I have never given any attention.

(The witness withdrew.)

JOHN TRICKETT, Esq., called and examined.

6026. (The Chairman.) Are you now chief engineer of Keyham dockyard?—Chief engineer and inspector of machinery, which position I have held for 21½ years.

6027. Have you conducted the examination of the engine-room artificers who have entered into the service of late years?—Yes.

6028. Do you remember what proportion of them come from the private trade, and from our own factories?—I do not.

6029. Have you examined some from here?—Yes.

6030. I presume that those who come from our own factory, you are satisfied with your knowledge of, or do you give them a bit of test work to do?—Not actual mechanical work, but I test them with regard to their knowledge of arithmetic, to see that it is sufficient to carry them through; we have a perfect knowledge of their capabilities as workmen.

6031. Do you examine them in their knowledge of the different parts of an engine?—I give them a slight examination. For instance, those who are boilermakers as a rule know less of the details of an engine than they do about a boiler.

6032. What trades have you entered and examined?—Boilermakers, fitters, and, a considerable time ago, one or two coppersmiths, I do not remember the number exactly.

6033. Any smiths, or blacksmiths?—I remember one, an enginesmith from our own shop.

6034. An enginesmith is a higher class of smith than an ordinary blacksmith, is not he?—Yes.

6035. Are all your blacksmiths enginesmiths?—All our smiths are enginesmiths, and all the angle-iron smiths are called boilermakers.

6036. Do you think that at the present rate of pay which we offer we can obtain good men for the service; it is 5s. a-day on first entry, and 5s. 9d. a-day after three years' service, with no further rise?—I

question whether you could get first-class men to enter for that; I think not.

6037. Do you think it would be better to give them a rise after a few years' service rather than to increase their pay on first entry; what pay do you think we ought to give them after ten years' service?—A good smith or a fitter, a first-class man, would get probably 6s. 8d. to 7s. a-day, and probably up to 7s. 6d. a-day, irrespective of overtime.

6038. (Mr. Wright.) That is for six days in the week?—Yes.

6039. (The Chairman.) In considering this question, we must bear this fact in mind, that on the one hand he gets paid for seven days in the week, provisions and lodgings, full pay while sick, and medical attendance, permanent employment for as long as he chooses to conduct himself well, and a pension at the end of twenty years' service. On the other hand, he has got to undergo what he considers hardships, and is separated from his wife and family. One must bear those *pros* and *cons* in mind when comparing the two cases. Should you think that 7s. 6d. a-day at the end of ten years would be a fair rate of pay to give him to enable us to retain him in the service?—That is a question which I can hardly undertake to answer. I should think, probably, that a man would expect a little more than that after that length of service.

6040. In addition to the advantages which I mentioned just now, he gets provisions which are worth 1s. 1d. a-day to him?—Yes.

6041. Perhaps you have not talked with any of them on the subject, and do not know what their feelings are with regard to it?—No, I do not. I am sorry that I cannot give you any information upon that subject; it is a question which I have not considered at all.

6042. Have the factorymen who have entered the

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service as engine-room artificers been thoroughly well trained men in all respects?—As far as I know, they have been of good conduct before they joined, or else we should not give them a certificate.

6043. Have you had considerable experience with regard to the training of engineer students in the dockyards during the last ten years?—Yes.

6044. Have you any suggestions to offer to the Committee as to the mode of training them, either as regards their educational training, their practical training, or their treatment in the dockyard generally?—My experience of them has been that they are better educated theoretically than they are practically. I do not think there is any reason why it should be so specially; but that is the rule, although there are many exceptions. I may say, however, that some of the students who have taken the highest place at college have been amongst the best practical workmen we have.

6045. As workmen?—Yes, I think that the time which they have to devote to practical matters is hardly sufficient to make them thoroughly practical workmen if you want them to be such. In the early part of their time, at any rate, their practical work is very intermittent, and very much interrupted by their having to attend school. I do not presume to say whether that is right or wrong, as I do not wish to go into that question; but I think it has rather the effect of breaking, as it were, the continuity of their work, and sometimes putting them out of sorts with it. If you wish the engineers of the navy to be a thoroughly well educated class of men, and to have nothing beyond a small practical knowledge, then their training might be carried out as it is now; but I repeat, that if you want them to be thoroughly practical men you must give them greater time to acquire their knowledge in that respect. For my part I think it would be better for them, and it would be making a better use of their time, if each student were placed with one of the first-class workmen, for instance, in the factory, and that that man should have some consideration to make it worth his while to give them information and instruction, and to devote some time and attention to them. It is a very old-fashioned arrangement in factories, and from my experience I think it is a good one, as it is found that the trade boys get on faster than the students do now.

6046. Is that what you do with the trade boys?—Yes; the men are not paid for it, but the boys are the sons of the men employed in the factory, and, if not immediately with their fathers, they are near them, and so an interest is taken in them.

6047. In the case of an engineer student, you would like to give the man who is instructing a little payment?—I think it would induce him to take more pains in teaching the student, and by working among the men the students would see all classes of work, and how it is done, and go thoroughly through with it, which they can hardly be said to do now.

6048. Do you think that the engine-room artificers who enter the service are decidedly better than the engineer students when they leave the factory?—I certainly think that those who have entered generally from the factory, particularly those in the early part of the time, were really first-class workmen, and better than the general run of engineer students could be expected to be.

6049. Who pass part of their time in school?—Yes. Besides, I may observe that they are generally men who have been several years at work after their time is out.

6050. Do those boys who have entered as trade boys ever become engine-room artificers; have you ever known of any case?—Yes; I can hardly say how many, but several cases; they have been principally boilermakers.

6051. Are you aware of the class of society from which the engineer students come?—I do not know generally, but I could tell if I looked over the papers that they have to sign. Some of them, I know, are the sons of dockyard men.

6052. Here is a list of their parentage (*handing the same to the witness*)?—I do not always see the papers, but I know that many of them come from rather a humble class in life.

6053. They are the sons of dockyard labourers, artificers, and others in the dockyards?—Yes; we have had some from that class, and I think probably we have some now.

6054. If it be thought desirable to enter engineer students (looking to their future service in the navy) from a higher social class by nomination, are there any modifications in their treatment in the dockyard which you could suggest?—I think there are several little things that might be altered, such, for instance, as washing places being given to them, and they should not take up tickets at the gates.

6055. You would have them put their names down in a book?—Yes; the same as the draughtsmen of the present day; the students now in taking their turn in the drawing-office sign a book, and do not take up a ticket. I would generally accord every facility of that kind, corresponding with the raised status of the students.

6056. There would be many little things in the dockyard that could be done for them; that a gentleman's son could feel the same as is the case in a private factory, and there is no reason why that should not be so?—I know that large premiums used to be given, and are now, for the sons of gentlemen to enter into private yards, and I do not see why that class of men should not come into the service if they were treated in the same way. I should imagine that there are a great many gentlemen's sons who have been so brought up in private establishments, and if they were brought up in government establishments in the same manner, they would gladly adopt the service as their profession, if, when they passed into it, they were recognised as officers.

6057. Do you think that the circular of May 1873, which gave special directions about the practical training of the engineers and their examination, has had a good effect upon them?—I think to some extent it has.

6058. In speaking of placing engineer students under superior workmen, would you, as chief engineer, find any inconvenience in that, or do you think that with a little care you might carry on the work in the shops without any difficulty, and that no inconvenience need be felt?—I do not see that any inconvenience need arise from it, if it be a recognised principle and is understood. We expect the young gentlemen to recognise the ordinary discipline in the yard. I do not see any difficulty in that respect. There is one point that strikes me, which is an inconvenience at present, and that is this; that all the student's time is charged by rate of pay according to the work upon which they are employed; that is sometimes a heavy tax upon our estimates. I do not know whether it is within my province to say so, but I should be very glad to see some special vote taken for the training of the students, because, when the time and expense which are devoted to teaching them are considered, I think that their work would be nothing more than an equivalent for the education which they have received, or the money indirectly spent in the factory for the supervision and attention paid to them.

6059. (*Mr. Wright.*) With regard to the question of estimates, there are students in all the dockyards, and their time is all charged alike, so that the estimates are only relative; it does not matter in that respect?—Quite so.

6060. (*The Chairman.*) In the case as you put it, would you get a better return for the cost of the work in each shop if it were done so; your object would be that the work in the shops should be rated at its proper value?—Yes.

6061. When in the boiler shop would you be able to appoint a man to look after them?—Yes, during the time they are there.

6062. How long are they there?—They are three months in each shop.

6063. At present one leading man has charge of the whole?—Of the whole of the students; but of course there is always a leading man of the foundry or other shops, he simply takes charge of them in order merely to keep order and to see that they are employed. We have one leading man who is charged with the general supervision of them; my meaning is, that if each student were placed with a workman, we should find that he made more progress in a given time than is at present the case.

6064. At the present time they are given a job of work to do, or are told to do it, but there is no one to show them how to do it?—The leading man who has charge of the whole party is supposed to show them; he is stationed in the erecting shop; then the leading man of the upper floor, or fitting shop, takes charge of and instructs all that are under him; and that is the case with the leading man of every shop.

6065. In the summer time, between the hour of closing the yard at six o'clock, and seven o'clock, when they come into school, are you aware whether the students go out of the yard, or would wish to take their tea in the yard?—They generally go out; we have a special washing place for them.

6066. Is there any place in Keyham where the men can get tea and refreshment?—There is a dining room.

6067. Can the students get their tea between six o'clock and seven o'clock, if they want it?—Yes; there is a man in charge to provide them with it.

6068. Is there a place where they can wash themselves in that dining-room?—Yes.

6069. Where is that dining-room?—It is one of the low buildings on the side of the foundry, next to the terrace.

6070. You say that their schooling breaks into their practical work, it interferes not only with their training generally, but it interferes with the job which they have in hand; would you think it better if they had longer periods in the shop, and then longer periods in the school. I mean in this way: supposing they took a week in the shop, and a week in the school; or a fortnight in the shop, and a fortnight in the school, do you think they would gain anything by it, or would it be practicable?—I think so, and I think that it would be an improvement upon the present system.

6071. That is to say, supposing that the same proportion was kept up between the hours of educational work, and the hours of practical work?—Yes.

6072. Do they take advantage of the drawing instruction in the fourth year?—Yes.

6073. Where do they go?—We have a drawing class in the evening in the usual drawing office, and the chief draughtsman attends to them.

6074. Is he paid anything for it?—He is paid for just the extra time; they go for a period of three months into the drawing office, to take general work; that is regularly carried out. They all attend and go through the drawing office at the end of their time.

6075. You are aware now that the students are allowed to go up to college after five years and six months' time if they can pass; do you find any objection to their losing that six months' practical work?—It is so much practical time lost; but if it be of more importance that they should have that time in the college, then there is the equivalent.

6076. No doubt, after the present instructions come into full play, and when the entries are only once a year, there will be no objection on that score; is it better to come up at five years and six months rather than wait for six years and six months?—I think so, if they can pass. I think, as a general rule, those who are most attentive, and best up in their educational training (of course there are some exceptions) are generally the best workmen. Some, I feel bound to say, do not avail themselves of the informa-

tion that is floating about them, and which is of importance to them; but that will always happen anywhere.

6077. (*Captain Dowell.*) On an average what amount of overtime do the men generally get?—I can hardly tell you without referring; I could find that out for you; but we have been working overtime a large number of men, all the present year.

6078. Do you consider that you get a fair amount of work for the amount paid for overtime?—For overtime we do not get so much; the hours are shorter, but all the year round two hours after the ordinary working hours of the day go for a quarter of a day, and for every other period of one-and-a-half hours it is a quarter too, so that we do not get so much.

6079. Is the overtime worth the money paid for it as a rule?—We do not get a corresponding equivalent in the way of work; but rather less.

6080. In the factory none of your men are on the establishment, I think?—No, none.

6081. Do you think it would be a satisfactory arrangement if the engine-room artificers and factory men in the dockyard were assimilated, so that the engine-room artificers might be largely increased, and form a reserve in case of necessity?—That is a question which I could hardly answer; but I should scarcely think it would be a satisfactory arrangement.

6082. Do not you think it would be a more satisfactory arrangement if your men were all established men?—Yes, I think so, or a considerable number of them; I do not say all.

6083. And that would be meeting the case very much, would it not; it would give the factory men the advantage of seven days' pay instead of six, and the prospect of a pension?—I think that you would have to grow young men up into that, and not to take the body of men we have now for that purpose. I do not think they would care for it.

6084. Do not you think it would be an advantage if our apprentices, as they are being brought forward now, were brought forward as permanent servants of the Crown, to go afloat when required?—I question whether, out of such a very large number of men that we employ as first-class mechanics, a great many would not have a great objection to going afloat. That is a question which I have not thought out.

6085. Have you had any experience of engine-room artificers?—Yes, I examine them, and amongst the best engine-room artificers who have entered the service, have been men from our own factories.

6086. You think that many of them are first-class men?—Yes, as workmen.

6087. (*Captain Commerell.*) Provided it were found necessary to draw our reserve of engineers, in case of war, from the engine-room artificers, do you think that when they were unemployed on board ship, in peace time, you could find remunerative work for them in the factory or dockyard?—I should think so, but of course that would displace a certain number of other men.

6088. Do you think that the difference of pay, and the difference they have in their pension, would cause any dissatisfaction among the factorymen generally?—I do not think that they would amalgamate very well.

6089. Are you altogether satisfied with the physique of the engineer students?—I think, upon the whole, perhaps, they are fairly good; but I think there are a great many exceptions.

6090. Do you think, as a body of young men, that they would be prepared to undergo the various changes of climate and the vicissitudes of life which an engineer on a distant station has to undergo?—I suppose that they vary very much like other men; but I think from what I see, that some of them would be soon knocked up. Taking them as a body, there appears to be a large number of fine young men amongst them; but they are not all so.

6091. Do you think that there is good care taken in the medical examination?—I can hardly under-

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take to say; but they are young when they are taken, and one boy may develop into a much stronger man than another.

6092. (*Captain Dowell.*) They are examined medically afterwards, are they not?—Yes, twice; on coming in, and on going out.

6093. (*Captain Commerell.*) It has been suggested to us here by one or two officers, that with a view to raising the social standard of the engineer students, we should not give them any pay for one, two, or three years; does that meet with your approval or not?—I should think it would have the effect of preventing very needy persons coming in. A poor man's boy comes in, and he gets a rate of pay during the time he is serving his time here, which puts him in a position to help his parents. I think that should not be so; if the education you give them, and the advantages they have here, are worth anything, they are surely worth serving the first three years for, without pay.

6194. Do not you think that that might keep out the sons of very worthy men, who are not in a position to bring up large families?—Of course it is one of those things that cuts both ways; it might keep out deserving people, while you were endeavouring to keep out those whom you did not wish to come in; but looking to the value of the education and training which the students receive, and the pay and position to which they have to look forward afterwards, it does appear to me that you should really select in some manner (I am not prepared to say how) persons of a better position than many we have now in the service. I mean, not because a man is poor, but because the young fellow has never had the advantage of early training from childhood, and of forming a character upon which you can build an officer.

6195. Would you consider that nomination by the Board of Admiralty would answer the same purpose?—I hardly think that you can entirely give up open competition.

6196. I mean open competition after nomination by the Board of Admiralty?—Then it is no longer open competition, if you do that.

6197. (*Captain Dowell.*) Do you think that open competition is an advantage?—In one way, namely, so far as intellect is concerned; but there comes my difficulty. After you had ascertained the capabilities of all the candidates, and if you found that "A" was from a class of society from which you wished to enter boys, and that "B" was from a class from which you did not wish to enter them, and that they were, so far as educational ability was concerned, about equal, and on an equality as regards their physique, then I would take "A" in preference to "B."

6198. Supposing "A" is a little inferior to "B," would you take "B" in preference to "A"?—That would depend on the value you place on the principle of selecting from the class from which you wished to draw your officers.

6199. It appears to me that if you allow a person to compete, and if that person passes the required standard of examination, and there is a vacancy, he has a right to be entered, and can claim that right; but if you reserve the right of nomination for people who are to compete, the Admiralty may say, we will

keep this list in our own hands, and we cannot give you permission to compete?—Yes, I quite understand the difficulty, but I do not see the way to remedying it.

6100. (*Mr. Wright.*) With reference to that question of wages; do you think from first to last, the students earn the money which they get as wages?—I hardly think that they do, certainly not on the whole.

6101. Is there any want of agreement between the students and the men working in the shops in close contact?—I do not know that there is; but sometimes they are a little off-hand to the leading men, as young fellows will be.

6102. Nothing of any consequence?—Oh, no; there is no difficulty, and there would be no difficulty in carrying out what I suggest, if it were understood.

6103. It has been suggested that some officer of the rank of a Laval engineer should have the superintendence of the engineer students; how would you, as chief engineer of a dockyard, think that system would work?—I hardly think that it would work well. I think that if they are to be taught their practical education, it should be done as it is now. I should think there is less liability of things going wrong, or difficulty and trouble arising. I should certainly myself not advocate that arrangement.

6104. In addition to the suggestions you made about attaching students to leading workmen, you mentioned that you thought their practical time was scarcely long enough; are there any other suggestions which you would wish to make about their training in the different shops as laid down in that circular of May 1873?—I think the time probably in some of the departments is long enough; but I would myself recommend that they should take a turn in the pattern shop, and millwright's shop, we might call the two as one in that case. I think it is a very excellent training.

6105. You mean working in wood?—Yes, I think they would get a better knowledge of pattern making and moulding then. They go into the foundry now, and simply mould from patterns; but if they had a pattern to make, particularly a core box, it would be better; and altogether they would know more about the business.

6106. Would not that render it necessary for each one to have a set of tools?—The government might find tools amongst other things, but I merely mentioned that, because it is, I think, very excellent training. I know that for any mechanic who wants really to understand all the branches of his business, it is essential.

6107. For those who come in as dockyard officers, but is it essential for those who will be all their lives naval engineers?—Then it becomes a question whether it is desirable to send them into the foundry by the same rule. I would take the pattern making in conjunction with the foundry, one to assist the other.

6108. (*Captain Commerell.*) Should you consider that an engineer student should be thoroughly up to hand turning?—It is so little practised now, that it is not considered necessary; it is a thing that almost any handy man with a self-acting lathe, or partially self-acting lathe, could do; almost all our lathes are fitted with sliding rests, some are self-acting, and some have to be actuated by hand.

(*The witness withdrew.*)

[Adjourned to to-morrow at 10 o'clock.]

FRIDAY, 5TH NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., J.C.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary

RICHARD SENNETT, Esq., R.N., called and examined.

6109. (*The Chairman.*) What position do you hold at present?—I am second assistant to the chief engineer of Keyham Factory, Devonport.

6110. How long have you been in the service?—My commission was dated from 1867, but I was at South Kensington till 1870.

6111. What certificate or diploma did you obtain at South Kensington?—A first-class fellowship.

6112. Have you obtained a Whitworth scholarship?—Yes.

6113. In what year?—In 1869; the first year that the scholarships were given.

6114. How long were you as an engineer student in the dockyard?—I was nearly five years in the dockyard before I went to South Kensington.

6115. And then you were five months in the dockyard the following year, the sixth year?—Yes, for the three following summers. I was 15 months in the yard, whilst a Kensington student.

6116. What duties did you do during the 15 months that you spent at the dockyard?—In the mornings we were engaged in the workshops and on board the ships at actual mechanical work; in the afternoons we were sketching different parts of machinery, and those sketches were put into a book and sent to the Admiralty each month, with an account of the way in which we were employed during the month.

6117. Had you instruction in drawing at South Kensington?—Yes, for the first two sessions we had instruction in drawing on two afternoons in the week.

6118. Had you instruction in drawing in the dockyard before you went there?—I had not. The students of my year went into the drawing-office about a month or two after I went to South Kensington.

6119. Would you have found it of advantage to you if you had received instruction in drawing before you went to South Kensington?—Yes. The time which I spent in drawing at South Kensington might have been spent in acquiring a knowledge of subjects of more real importance to an engineer.

6120. While in the dockyard did you take private lessons?—No.

6121. You never did?—No.

6122. Did you ever attend any of the science schools?—They were not open when I was a student.

6123. Were the hours for attendance at school the same, in your time, as they are now?—Yes, with the exception of the Wednesday evenings. We used not to go to school on Wednesday; only two afternoons and evenings a-week.

6124. In your fifth year at the dockyard, did you attend school?—Yes.

6125. In the day time?—Yes; the rule then was to attend school during the whole of one's studentship.

6126. You had the same hours of schooling in your fifth year as you had previously?—Yes.

6127. In the course of your training did you find any inconvenience to yourself from attending the fitting shop and school on the same days; did it interfere with your practical work in the shop or your

education in the school?—It is likely to interfere with the practical work in this way, that if the student has to leave off in the middle of a piece of work, his interest in it, to some extent, is taken away.

6128. Does that piece of work go to any one else?—If it be wanted it is finished while he is away.

6129. From your experience at the dockyard as a student, would you think it desirable to have the schooling limited to certain whole days, and the practical work to certain other whole days, keeping up the same proportion of time as is now kept up?—That would do, provided the schoolmaster did not depend entirely upon what he taught in the school, but considered it his duty to a great extent to direct the style of reading by class lectures, clearing up the difficult points, and indicating the subjects to be read during the intervals between the school periods.

6130. Did they, as a rule, read up at home?—All those who wished to get good positions worked at home in the evenings; in fact, the greater part of the work was done at home in the evenings.

6131. In the summer, when you worked in the shop till six o'clock, and then went to school in the evening, did you find any inconvenience from the fact of having had a whole day's work?—I had not any of it except for the first year of my time, before we went to school in the afternoons at all. Some used to go in the evenings; they used to leave the yard at six o'clock and get into school at seven, which was rather a rush.

6132. Nothing more than "a rush"?—Nothing, except that after ten hours a-day one was not so fit to study as would have been the case if the hours of work had been shorter.

6133. Had you any place in the yard in which you could get your tea, or to wait in during that hour, if you wished to remain?—No.

6134. Would any of them have found that a convenience?—Yes, I think so.

6135. Do you think it would be desirable to make that arrangement for them?—I believe that now there is an arrangement of that sort; a place has been fitted up for those students who live a great distance from the dockyard, so that they can have their tea in the dockyard and go to the Wednesday evening class.

6136. Are you aware of the system for entering engineer students at present?—Yes.

6137. It is, I believe, open competition?—Yes.

6138. And is limited to no particular class of society; any one can come in?—Quite so.

6139. Do you think that is a good plan?—I quite see that evils have arisen from it so far, but I think that those evils may be remedied, still keeping the present system of open competition. One way would be this: by making the future position such as to commend itself to parents who occupied a respectable position in society; they would then let their sons compete, and if so they would beat those we now have. Any boy from a grammar school knows Latin as a matter of course, and if that subject were introduced into the examination it would not make it more

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difficult, but it would place it entirely out of the reach of boys from board schools.

6140. Are there not special cramming schools for preparing boys for this examination?—Yes, there are; and there would be in any case, I think.

6141. Do not you think that those schools would introduce Latin?—I do not know that the masters know Latin.

6142. But would they not spring up if they found that Latin was required in the examination?—Perhaps so. Another way would be to reduce the immediate advantage of entry. In a dockyard town, where education is cheap, if a boy be a clever boy, he soon becomes the head boy in an elementary school, and when he reaches 14 years of age his parents, who are probably poor people, and to whom the pay given is a great consideration, jump at the idea of putting him into the service. There is no question, I think, that if the immediate advantages were not so great, there would not be the struggle that there is now to get into the service, by people of that class.

6143. Do you think it desirable that the only limitation should be a money limitation; would not that shut out the sons of poor gentlemen who might wish to send their sons into the profession?—Most gentlemen who wish to bring their sons up to a profession have to pay heavily for it; in fact, in no profession, so far as I know, outside the service, do the apprentices or pupils get any money during the first two or three years of their training. They are supposed to receive a training, and they are expected to pay for it to some extent. Even in a trade such as a draper's they have to pay a premium.

6144. Would not a great object be gained if the nominations of the candidates were given by the Board of Admiralty, and that then there was a competitive examination amongst those nominees?—Yes, that would meet the case also.

6145. And would not that be in accordance with the custom in every other class in the naval service?—It would be.

6146. In the event of its being found desirable to introduce men into the engineers belonging to rather a better class of society, are there any modifications in the treatment of the students while in the dockyard that you would suggest?—Yes; I think that if they were to enter the yard, say, a quarter of an hour after the men, it would be better; they need not come in with the men, and they might have a place where they could take off their coats and put on their serge jackets to go to the shops; then they might leave their work about a quarter of an hour before the men, so that they could prepare and wash themselves to go out, and go out before the rush of men. Again, I do not think that they ought to take up tickets. We have only about 50 or 60 students here, and I think that two or three books might be placed, in which they should sign their names each morning and afternoon when they came in and went out. I do not think that would introduce any difficulty, and it would in itself constitute an independent caste from the men. With regard to their work for the first three or four years, I do not think that you could much improve upon the present system, because they are kept to a great extent separate from the workmen, and they have a leading man detached to take charge of and instruct them; in their fourth year they go through the different shops, coppersmithing, boilermaking, and so on; in the fifth year they come back to the erecting shop, and then they ought to be employed on the big work carried on there. I think that during that fifth year they might be told off to the principal workmen in the shops, and that those men should receive, say, 2s. a-week each for giving them instruction. At present in the erecting shop we have some very good pieces of work on; we have the large engines for the "Tamar" in hand; and the man in charge of that job might have one or two students with him, and be paid 2s. a-week for looking after them. In that way they would get instruction in

the erection of large engines, and in setting out bearings, &c.

6147. The students working with the men?—Yes. There is another point which has reference to the economical working of the factory. I think that their lordships ought to be prepared to sustain a certain loss in the work which the students do. They ought not to expect to get a fair equivalent in work for the money paid, because if they do the matter stands thus. The leading man or foreman of the shop is responsible for so much work being turned out for so much money, and there will be a great temptation to keep the students employed on inferior work, or work upon which they can earn their money, and not to give them superior work to do, on which the shop would lose money.

6148. Without reference to their instruction?—Yes. That temptation might be got over, but not while the pay of the students is charged to the wages of the yard.

6149. Could that system of giving additional instruction in the erecting shop be carried through all the shops?—Yes, I think so; it used to be to a great extent in this yard. I think that is the system in a great many of the large factories. We have a lot of trade boys in this factory; some of these are in the same shop with their fathers, and those men take an interest in their boys; the consequence of which is that it is found that those boys make twice as rapid progress as the other trade boys.

6150. Do you think that that as a rule affects the instruction of all the students and the trade boys; that the workmen as a rule pay more attention to the trade boys than they do to the students?—Yes, I think so.

6151. It is natural that they should?—Yes.

6152. Do you think that if it were practicable it would be for the benefit of the students, supposing their number was reduced, if they could live and mess in the dockyard under the charge of a naval engineer?—Yes, I think it would be; it would promote a sort of *esprit de corps* amongst them.

6153. At present do the students come from the locality?—A large proportion does.

6154. What do those students do whose friends reside in the midland counties?—They have generally lodgings about; sometimes they board with families, but they generally take lodgings by themselves.

6155. Have you any suggestions to offer to the Committee as to the present position of the engineers in the service with regard to their promotion and pay, or is there any improvement which you would recommend?—I think in order to make it attractive to students of a higher social status, they ought to enter at the rank of sub-lieutenant. The general feeling is, that a man after he has completed his time in the way that the students have, ought to be called an engineer.

6156. On first entry?—Yes; and I also think that there ought to be some sort of intermediate rank, between that and the rank of chief engineer, for those officers who have served five or six years, and qualified for the rank of chief engineer. Those men would be qualified to take charge of the machinery of small vessels, and might be called "engineers qualified for charge," or "passed engineers," or "staff engineers"; something as an intermediate rank, with some distinction in the uniform; and that then they should have the option of becoming ward-room officers, the same as assistant paymasters, after five years service as such. A man ought to have a prospect of promotion to the rank of chief after about ten years' service in all ranks; he is qualified, according to the present regulations, after eight years, but he ought to have a reasonable prospect for promotion when about 30 years of age.

6157. You consider that no engineer should remain without promotion after a certain age; at what age do you think he ought to be promoted?—It is not worth while promoting a man after he is 35, as he would not have much opportunity of getting full time

in after that age. Again, if a man be kept too long in a subordinate position, it unfits him to some extent for taking a higher position; that is to say, if he for too long considers himself as a mere subordinate.

6158. Have you given the subject of their pay any consideration, or have you seen any of the pamphlets which have been brought forward by the engineers (*a pamphlet was handed to the witness*)?—I have seen this before. I think on first entry they ought to start with 7s. a-day instead of 6s., and after a man has served some years, and is getting on to nearly 30 years of age, especially if he has not any chance of obtaining promotion, he ought to be receiving more money than 9s. a-day. I think that an engineer after about fourteen years' service, if not promoted, should be receiving 13s. or 14s. a-day. A man at 34 has as much useful experience as he will possess at any other age. At present an engineer cannot go beyond 10s. a-day, and he only gets an advance from 9s. to 10s. a-day during the time that he is an engineer, and in my opinion a progressive rate of pay would be better.

6159. Are you aware of the age at which engineers are promoted to the rank of chief engineers?—The age now is from 40 to 42.

6160. Can you suggest any immediate way of improving or expediting that promotion?—If all ships commanded by commanders had a chief engineer instead of an engineer-in-charge, it would improve it. Most of the smaller ships now have more power and more complicated machinery than the old ships which used to carry chief engineers. They have high pressure boilers and compound engines. I speak of those ships of the "Fantome" class, which work up to 900 and 1,000 horse-power. The old 200 horses nominal used to go up to 600 or 700 indicated, and carried a chief engineer. If that were done, it would make an addition of about 40 chief engineers. Then if some inducement were offered to the senior chief engineers on the list to retire, it would cause a more rapid flow of promotion. If greater inducement were given to the engineers to retire, I think that many of them at the top of the list would go. They cannot retire on their present pensions, but I think if they had 6d. a-day for every year's service up to a certain limit, they would be satisfied. Most men ought to be promoted before they have had 20 years' service, but if their pension came up to 9s. or 10s. a-day, a great many of them from the top of the list would retire.

6161. And that would reduce the list in proportion to the amount of retirement offered?—Yes.

6162. Would you alter the complement of those small ships in which you recommend a chief engineer should be placed?—I think the ships of the "Fantome" class have two engineers and two engine-room artificers. If you put a chief engineer in you might put one more engine-room artificer, because there is a great deal of work to be done in a ship of that class. I would have a chief engineer, one engineer, and three engine-room artificers.

6163. At present the engineer in charge would not do the manual work himself?—No, except in case of necessity; he would have to do it then, whatever rank he held.

6164. In the present case one engine-room artificer has to keep watch in the engine-room?—I think it is arranged generally for each engine-room artificer to keep watch in the engine-room. When an engine-room artificer is on watch, the engineer supervises him, and holds himself responsible.

6165. Which the chief engineer would do in the same way?—Yes; it seems to me, that simply because a man is a chief engineer, it need not necessarily alter his duties, for it is better for a man to do work with the rank of chief engineer, than it is to do the same work with the rank of engineer. In the smaller class of ships, the "Decoy" class, they have two engineers and one engine-room artificer, but many of the engineers would rather be without the second engineer, and have an engine-room artificer instead, because

there is no accommodation for the engineer officer, and no place for his chest.

6166. Where they have two engineers, do you think so?—Yes.

6167. What would happen if the engineer got sick?—It would only be of consequence when employed on detached service; but you must, I think, take the risk of that, the same as you must take the risk with the doctor.

6168. Have you been shipmates with engine-room artificers?—Yes.

6169. In what ship?—In the "Crocodile."

6170. How many were there, and what trades were they?—There were three; two good boiler-makers, and the other was a sort of handyman all round. I think by trade he was a smith, but he had been in the service before as a stoker and he was a very useful man.

6171. Do you think that is a good proportion of trades, two boiler-makers and a smith?—I think if it could be managed, it would be almost as well to confine them to boiler-makers and fitters, because a boiler-maker is very handy for the ordinary smith's work that you will get in any ship. Most of the smithing would be bending plates and angle-irons, and they are accustomed to that sort of work.

6172. Do the fitters, as a rule, know anything of an engine smith's work?—Yes; most fitters know a little about it, at any rate enough to be useful.

6173. If the number of engineers was reduced, as you suggested, would you introduce a certain proportion of engine-room artificers into large ships in their place, and reduce the number of engineers in each ship?—Yes.

6174. Taking for instance a ship like the "Sultan," her complement is one chief engineer, nine engineers, and four engine-room artificers?—I think that five engineers would be ample. When ordinarily under steam, you would want three engineers, one to take general supervision of each watch; an officer always ought to be on watch in a ship of that sort; then the senior would be for general duties about the ship, and to assist the chief engineer in keeping the books, and so on; and in a big ship like that, I think, it is necessary to have one officer well acquainted with the double-bottoms, pumping arrangements, and watertight doors, who should be responsible to the chief engineer for the safety of the ship.

6175. Do you think that an engine-room artificer might be made competent to do that under the chief engineer?—Yes; he might be made competent to do it; but unless a man has something to lose, you cannot make him responsible. The worst that could happen to an engine-room artificer would be dismissal from the service, and he could get another job as a fitter or boiler-maker anywhere, and would not fancy that he had suffered very much.

6176. An engineer would lose a very much higher position?—Yes.

6177. Are you aware that engine-room artificers keep watch in the engine-room of many of the small ships which have compound engines and high pressure boilers?—Yes.

6178. Do you think that an engine-room artificer, who had performed that work satisfactorily for two years, might be trusted in an emergency to keep watch in the engine-room of a large ship?—Yes.

6179. You would consider him competent to do that duty, bearing in mind that qualification which you just now put in, that he is not such a responsible man?—Yes, the senior engineer would hold himself responsible and keep a general supervision, although not on the platform all the time. The engine-room artificers are of course from the same source which supplies most of the engineers to the mercantile marine. Certainly in all the smaller companies the men have not any higher qualifications than engine-room artificers possess. In the large companies, the Peninsular and Oriental, for instance, it is different.

6180. Do you consider that the education of the engineers of the present is satisfactory; when I say

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"education," I mean without reference to the practical training about which you have already spoken?—It is difficult to teach them the principles of their profession before they go to college. There is one question with reference to the setting of the slide valves which they do not seem to know much about. I do not mean the men at the college; but the men before entering the college; questions on the principle of the engine they do not seem to have got hold of. Since I have been here I have been talking with the leading man in charge of them, who is quite as intelligent as the majority of the leading men you could get; he can show them how to set a valve, but it is doubtful if he could explain in a proper way the principles upon which a valve should be set. I spoke to the leading man of the erecting shop on the subject, and he said, "Well, sir, if you go through the shop I do not expect that you will find half a-dozen men who could set a slide valve," although they are all first rate men as mechanics.

6181. Have they instruction in the use of indicators at the dockyard?—We send the students in their fifth year round to the different dockyard engines in order to take indicator diagrams.

6182. Those engines are very simple, are they not?—Yes, they are.

6183. Does that give them experience in diagrams of every description?—Yes, they get experience in diagrams of every description; but I think that arrangements might be made so as to let them work out those diagrams properly, which they cannot do in the shop very well.

6184. Do you think it would be practicable to give the students, in their last two years here, lectures on the steam engine, or instruction in it? At present they have no instruction of that kind?—It could be arranged very well; even in the last three years; they could be taken on separate evenings.

6185. You must remember that in the fourth year they are in the drawing office?—In the evenings they get instruction in drawing.

6186. (*Mr. Wright.*) Do not they, during the last year, learn the duty of engineers by going out on trial trips, and taking indicator diagrams and calculating them?—Sometimes after the trial is over they take a few; there are always some of them on the trial, and they assist in calculating.

6187. (*The Chairman.*) You think that it would be desirable to give them instruction in the steam engine for the last two years of their time at least?—Yes; I think it is a subject with which they ought to be acquainted, but which they have no means at present of acquiring. You will find how little they know of the subject by the results of the examinations.

6188. Have you any suggestions to offer to the Committee with regard to the pay and position of the engine-room artificers which you think would ensure their being efficient workmen, and the retention of them in the service?—I think that the principal thing is to treat them as mechanics. There is one great grievance which they have, if not the greatest, which is with regard to their leave, and the menial duties of their mess. It very often happens that when leave is given to the ship's company, the engine-room artificers are employed below, and I have heard them say that when they have finished their work and have come up from below, they have to go to the master-at-arms to have their names taken to the commander; and the master-at-arms says, "why did not you come up before, when the men got leave; you cannot go now." Now those men have been accustomed to be treated in a different manner; they are men of 25 or 26 years of age when they go to sea, and do not like that. I do not myself think that they would care so much about their absolute position in the ship so long as they were under the chief engineer and the executive officers, and not under the police officers of the ship, if I may so call them. Again, the engine-room artificers, more than any other class in the ship, ought to have some place to which

they could retire, if it could be so managed, away from the ship's company.

6189. You mean that they should have an enclosed place and mess by themselves?—Yes; in small ships it might be arranged to have a general mess of the chief petty officers, but they prefer to be by themselves as their ideas are different to the ideas of the ship's company and most of the chief petty officers; they would like to have a boy told off to scrub their mess and their hammocks for them.

6190. Those are their chief points of complaint you think?—Yes, of course there is the pay; after a man has served for seven or eight years in the service, whatever he might have been when first entered, he could go and command good pay outside in any mercantile company. If a man were to go at thirty years of age and say I have had ten years' service at sea in such and such ships and my character is good, he would be able to command a high rate of pay.

6191. What pay would you give them at the end of ten years' service?—Judging by the rate of pay which they give in the shops here (they go up to 8s. a-day) I should think that an engine-room artificer ought to receive 8s. a-day after ten years. There ought to be an inducement for them to remain in the service.

6192. In speaking of the relative pay ashore and afloat, have you taken into consideration the many advantages which they receive by serving afloat, such as attendance, and their pay when sick, permanent employment, payment for seven days instead of six days in the week, provision money and the prospect of a pension?—Yes. I think that as far as being paid when sick is concerned, it does not go for much, as most of the men are members of trade unions and clubs, and from those societies they receive a certain amount of pay when sick, although not full-pay. It is true that they are paid for seven days a-week instead of six, but then most of the men in the factory here are getting paid for eight days a-week now.

6193. On account of working extra time?—Yes, it is more than that; I think they are working a day and a-half each day. Again, those men who have been ashore, and have had the comforts of a home until past twenty years of age, think that they ought to receive a great many advantages to compensate them for those lost comforts and for being away from home perhaps three or four years at a time. Most of them are married when they enter the service, and they think that their loss of comforts ought to be compensated for.

6194. Are you aware what is the amount which the engine-room artificers receive as check money when working on board ships other than their own?—I think 3s. a-day.

6195. In the case of the dockyard artificers getting paid for eight or nine days in the week, they have to work extra hours for it?—Yes. Now they work from seven in the morning till eight at night; that is, those working overtime.

6196. That is in the dockyard?—Yes.

6197. Have they anything like those hours to work on board ship, even when receiving extra pay for working on board other ships?—They are always liable to be called upon, and in cases of emergency they might be working as long as that. In the case of a ship being wanted in a short time, the engine-room artificers sent off to get her ready would have to work as much as that, and perhaps more.

6198. Do you think that if we wanted to enter a number of engine-room artificers in the service, we could get them by giving them progressive pay only, or do you think that the pay on entry now is sufficient to induce them to come?—I think if you give them 5s. 6d. a-day, which is more in accordance with the pay in the country, as the wages are high and trade is brisk, it would be better. There seems to be no trouble about getting work in the engineering trade.

6199. It has been suggested to us by an engine-room artificer, that, as a body, they would like to be

removed from the list of chief petty officers, and be after a period promoted to the rank of junior engineers; do you think that would be desirable?—I do not think it would. That is not the way to raise the status of the engineers. It would be very undesirable, because engine-room artificers are not engineers. An engineer is a man who has learnt a profession; but an engine-room artificer is a man who has only learnt a trade.

6200. Do you consider it a necessity that, whatever number of engine-room artificers we have in the service, we must have a body of men in a high position as engineers to superintend them?—Yes, certainly; the machinery is now so complicated that it requires men of responsibility, and who have had an intellectual training, to properly take charge of it.

6201. You have suggested, I think, that after a certain length of service as engineers, another rank or a section of them might be so divided by having an increase of pay as competent to take charge of engines, and that they should mess in the ward-room. Do you mean that engineers of that rank should mess in the ward-room at all times, whether in charge of engines or not?—Yes, become ward-room officers; but I would make it optional as in the case of the assistant-paymasters; after five years they should have the option of electing to become ward-room of officers, or remaining in the gun-room.

6202. Should you think it desirable, in the present state of the list, and looking at the class from which some of the engineer students are drawn, to at once abolish the engineers' mess and let them mess in the ward and gun rooms?—At present in large ships the number is so great that there would be a difficulty. I think it would be better if the engineer students, or junior engineers rather, on first entering the service went into the gun-room mess at once, notwithstanding the origin of some. If that were the case, it would certainly fit them (if they were not fitted before) to associate with gentlemen; but a great many of them, judging from the mess at Greenwich, conduct themselves in a very gentlemanly manner, and I do not think that there would be much trouble with the junior engineers. The only difficulty that I see in adopting it at once is on account of the number of engineers. If the number were reduced I do not think there would be any difficulty.

6203. Are not a great many of the young engineers married men with families?—I am afraid they are.

6204. Do not you think that might be a difficulty with some of them, and that they would not like going into a more expensive mess?—The gun-room mess for the junior engineers would not be very much more expensive, at all events; it would be about the same as the engineers' mess. Of course, a man need not launch out into a lot of unnecessary expenses, or voluntary expenses. I have heard engineers in charge, who have been men with families, and with smaller pay (considering their families) than junior engineers, say that they have had no difficulty in keeping up a proper position in the ward-room.

6205. (Captain Dowell.) What duties at sea did your engine-room artificers perform in the "Crocodile"?—They kept the stokehold watch at sea.

6206. Were they in charge of it?—Yes, with an engineer in charge of the whole watch.

6207. Was there only one engineer on watch?—Yes; and the engine-room artificer for the stokehold.

6208. Do you think that there are many men in your factory who are earning 56s. a-week?—Not very many perhaps, but there are several who are paid from 7s. to 8s. a-day.

6209. Do you think that if there were a uniform established for the engineer students, it would be a satisfactory arrangement?—It would certainly give them a position, and tend to make them more distinct from the workmen.

6210. Have you ever heard any complaints about the uniform of the engine-room artificers?—Yes; they are opposed to their jacket, and they want a single-

breasted frock coat similar to that of the writer and the master-at-arms.

6211. (Captain Commerell.) From all the evidence we have heard with respect to the engine-room artificers, it appears that the police of the ship, scrubbing hammocks, and the messing arrangements, are the great stumbling-blocks. Will you, from your experience, tell me whether you think that they have any valid reason for complaining of their treatment in those respects?—On board the "Crocodile" our engine-room artificers did not scrub their hammocks; they used to pay one of the stokers to do it for them, but they were responsible for the cleanliness of it. For their mess-berth there was a second-class stoker excused from duty to look after it, so that those objections did not obtain there.

6212. (The Chairman.) Did they mess by themselves?—Yes, in the forward part of the lower poop deck. There was a place screened off with a canvas screen for them; there was no door to it; it was an open doorway, but it was secluded, because it was right in the very bows of the ship. One had no occasion to pass it, but had to go there specially, if necessary.

6213. (Captain Commerell.) From your experience you have not seen that they have had any valid reason to complain of their treatment, at any rate in the "Crocodile"?—No; not in the "Crocodile."

6214. Do you think that the engine-room artificers take into consideration sufficiently the great difficulty there is in a large community, like that on board ship, in making differences between chief petty officers and officers of relative rank?—Perhaps they do not, but then they do not look upon it in that light; they look upon it in their home point of view, comfort; and their argument simply amounts to this: if I am in the service I get a certain amount of pay and a certain amount of inconvenience, but if I am out of the service I get a certain amount of pay without that certain amount of inconvenience.

6215. Do you think that, without interfering with the discipline or well-being of the ship generally, that arrangements could be made to render those men more comfortable in their mess and with regard to their leave, while at the same time that necessary discipline and supervision, which the executive must have over every officer and man on board a man-of-war, could be kept up?—That is a question which I can scarcely answer, but I think that if those men were regarded as mechanics, whatever rank you gave them, it would be better. I am not quite sure whether it would not be as well to have them on board without any rank at all.

6216. (Captain Dowell.) That would be impossible, because they must take charge of the stokehold?—Then I would give them a rank before that of the master-at-arms, or place them in a position distinct from the master-at-arms.

6217. (Captain Commerell.) Do you think, taking into consideration that they should be highly qualified mechanics, that it would be better, in place of giving them relative rank, to attach them, as far as it could be done, almost entirely to the engineer's department, with due reference to the discipline of the ship?—Yes, that is, as I understand, to make them quite distinct from the master-at-arms; and that for leave and arrangements of that sort, the chief engineer should be more immediately in connection with the engine-room artificers, and the engine-room artificers should be responsible to the executive, through the engineer branch, instead of through the master-at-arms.

6218. In former years, before the engine-room artificers were introduced into the service, there used to be no difficulty whatever, from the leading stokers and stokers having in every way to conform to the usual regulations of the ship?—No.

6219. Then why should there be now with the engine-room artificers?—That is simply because they are mechanics, and of a different class altogether to the men that we have as stokers; the stokers

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were laborers on shore, but the engine-room artificers are skilled mechanics and have received a different sort of treatment all through their life. Take a fitter in the factory for instance, most of them consider themselves better than warrant officers on board ship, and they are most of them better off. They do not think much of chief petty officers *per se*; they think themselves much better than most chief petty officers on board ship, and when they go on board they do not like to feel that they are subject to the will of chief petty officers.

6220. (*Captain Dowell.*) In fact they object to discipline?—They do not object to discipline as discipline, but they object to having to perform what they regard as menial duties, and they have certain disadvantages as regards their leave.

6221. (*Captain Commerell.*) Do you think that an engine-room artificer on first entering the service thinks more of his present pay or of his future pension?—If a young man he thinks more of his present pay.

6222. And after ten years service?—Then he would think a good deal of his pension, but he would think of his pay as well.

6223. Do you think that if the engineers as a body, taking into consideration the various ages at which different officers attain to their various ranks, received the same pay relatively they would be satisfied?—Yes, if the ages at which they reached the various ranks were approximately the same as those of other officers. I do not think that they would ask for more than that. At present a chief engineer's maximum pay is much below that of a paymaster, and very considerably below that of a doctor, and below that of a navigating officer. A paymaster's maximum is £1 13s. a-day, but a chief engineer only goes up to 22s. a-day, while the doctor goes still higher than the paymaster. The government have to train engineers themselves, because they could not get the same class of men as those who have paid premiums for their training outside to enter; the inducements are such that they cannot get the proper men to enter on the present scale of pay, taking into consideration the high qualifications which are required.

6224. (*Mr. Wright.*) Did you, or any of the other naval engineers who obtained first-class fellowships or professional certificates from Greenwich or Kensington, get any step in promotion on account of it?—I lost 12 months by it. An engineer student who gets a first-class certificate from Dr. Woolley or the college gets promotion to first assistant, and is made a commissioned officer after two years' service as second-class assistant; but it was decided that the Kensington students were not to get the time until promoted to engineers. We had not served at sea, so we lose 12 months, and that affects us all through our career in the service. Full and half-pay, and retired pay, only count from date of promotion to first assistant; beyond the 12 months for my certificate I gained nothing. I am in the same position now in all respects, as far as rank in the service is concerned, as if I had not been through the superior course at Kensington.

6225. Does any other class of naval officers gain a step in rank on attaining honours at the college?—Yes; I think each of the other classes does. The navigating officers get a lieutenant's commission by passing first.

6226. The one that passes the best?—They have a lieutenant's commission offered them as a prize to induce them to work, but the engineers have nothing.

6227. What do you consider are your prospects of obtaining promotion to the rank of chief engineer under the present circumstances?—As there are 500 or 600 on the list before me, and the rate of promotion is about 12 every year, suppose we allow 20, that will make it at least 25 years from the present

time before I can hope to gain promotion to that rank.

6228. What age will you be then?—I should be 53, and on the retired list.

6229. Do you find that your rank as an engineer is of any advantage or disadvantage to you in your present position in a civilian office in the dockyard?—It is a disadvantage, because you cannot divest chief engineers of the idea that they are senior to you in rank. It does not occur very much, but still one always feels that they have an idea that one is a junior; and in the case of any dispute arising, something to this effect would probably be said, "I am a chief engineer, and you are an engineer, and are subordinate in rank to me, and you must therefore obey me."

6230. (*The Chairman.*) Are you aware that no dispute as to rank can arise, as you are not under martial law, and a chief engineer is?—Yes; I am aware of that, but it is in smaller things that that feeling arises. No doubt if any grave dispute arose it would be all right.

6231. It is rather a question of law than of practice?—Yes; I have heard my predecessor say, that he had a very unpleasant time of it when he joined, with reference to some of the seniors in the reserve.

6232. Do you know of any instance of an engineer student who was capable of taking the higher place at the examinations refusing to go to South Kensington or to take advantage of the higher education offered?—No, I do not know of any such case.

6233. From your own experience and knowledge of the position open to more highly educated engineers, do you think that two each year is sufficient to pass through the high course at Greenwich?—Yes, I think so.

6234. You would not recommend more?—No. At South Kensington there were three or four each year, sometimes three and sometimes four. Out of those who passed through there are three employed in the dockyard, and I think two at Greenwich, and one at the Admiralty now. The man who passed out in the same year as I did, 1870, got a second-class fellowship. The value of a second-class fellowship is higher than that of a second-class professional certificate at the Royal Naval College, but my fellow-student is still unemployed in any way in which his extra training can do him any good. There are few means at present of giving him such employment as would enable him to make use of his higher education.

6235. Has he been serving at sea ever since?—Yes, until the last twelve months or so, during which time he has been in Mr. Covey's office in the reserve.

6236. Do you think if the best men had the offer of the higher education at Greenwich, without any prospect of getting appointments on shore, they would take advantage of it?—Yes, if they had the advantage of obtaining early promotion; if they had a chief engineer's commission offered them. According to the present system, a man is eligible for the rank of chief engineer after eight years' service, although he does not generally get it; but if a man who obtained a first-class professional certificate was promised a chief engineer's commission after seven or eight years, provided his conduct were good, I think you would then have men coming forward; without holding out any distinct promise of future employment on shore, you would have no difficulty in getting the men, because they would like to go through that superior course of instruction.

6237. Do you think it would be desirable for the service that selection should be made from the engineers more than is the case now, for promotion to the rank of chief engineer?—Yes, I think so; the bulk of promotions must necessarily be by seniority, but a portion might be given by selection.

(*The witness withdrew.*)

Mr. THOMAS WILLIAM RAMSAY, R.N., *called and examined.*

6238. (*The Chairman.*) Where are you serving now?—I am attached to the "Indus" in the Steam Reserve.

6239. Are you serving on board?—I am in charge of working parties in the Steam Reserve.

6240. What is your standing as an engineer?—Six and a half years.

6241. What pay do you get in your present position?—10s. a-day.

6242. Do you receive any charge pay?—No, no charge pay.

6243. Do you get a lodging allowance?—I receive compensation for provisions, 1s. 6d. a-day.

6244. What was your last ship?—The "Wolverene."

6245. What were you on board her?—I was senior engineer on board her.

6246. Not in charge?—No, not in charge.

6247. Was there a chief engineer in charge?—Yes.

6248. Have you ever served in an ironclad ship?—Yes, in the "Minotaur" before that.

6249. Have you ever had engine-room artificers with you?—Yes, in both my last ships, the "Minotaur" and the "Wolverene."

6250. What engine-room artificers had you in the "Wolverene"?—One engine-room artificer.

6251. And what number of engineers?—Three engineers besides the chief.

6252. Did the engine-room artificer keep watch in the engine-room or the stokehold at any time?—Yes, in the engine-room during the latter part of the commission.

6253. What was her horse-power?—400 horse-power nominal.

6254. What did the engine-room artificer do in the early part of the commission?—He principally kept watch in the stokehold under the senior engineer.

6255. Was the "Wolverene" his first ship?—Yes, in the service.

6256. Did he perform his work in charge of the engine-room satisfactorily?—Yes, very satisfactorily.

6257. What was his trade?—A fitter.

6258. Do you know whence he came?—He served his time at a place near Sheerness, in the private trade.

6259. Had he had any knowledge of the management of engines before he joined the "Wolverene"?—Not of marine engines.

6260. Did the chief engineer of the ship consider himself responsible for the watch during the time the engine-room artificer was on duty?—No, the senior engineer was responsible for the watch.

6261. He did not keep watch then?—Not at that time.

6262. Whose engines were those in the "Wolverene"?—Messrs. Ravenhills.

6263. In the "Minotaur," how many engine-room artificers had you?—Four engine-room artificers in the latter part of the time I was there; previously to that, they had ten engineers on board.

6264. What trades were the engine-room artificers?—One was a fitter, one a boilermaker, one a smith, and a coppersmith came afterwards.

6265. Were they good men?—The majority was; three out of the four were good men.

6266. Which was the bad one?—I think that the boilermaker was the least useful, or the most indifferent.

6267. By "smith," do you mean enginesmith?—I think he was a blacksmith.

6268. When did you enter the service. In the year 1863.

6269. From where?—From Messrs. Hawthorne's, at Newcastle; the private trade.

6270. Were you just then out of your time?—Yes, just out of my time. I never had any work in any other employ.

6271. Have you qualified for chief engineer?—I have.

6272. When did you qualify?—About seven years ago; in 1868.

6273. When do you expect to get your promotion to the rank of chief engineer?—At the present rate of promotion I have no expectation of getting it at all.

6274. How old are you now?—32 years. I shall have been 13 years in the service next February.

6275. Do you think that the promotion of engineers is satisfactory?—No.

6276. What would you suggest to improve it?—There are several methods of doing it; one would be by employing chief engineers in all steam ships in the service. Whether an engineer in charge, or chief engineer, he does the duty of chief engineer; and another way would be, to give a greater inducement to retire to the senior engineers on the list who can never be chief engineers, those who have not qualified, or cannot qualify.

6277. If you reduced the number of engineers, would you substitute engine-room artificers for them?—Yes, I would substitute engine-room artificers for them.

6278. Do you think that they could efficiently perform a large portion of the duty of an engineer in a ship?—I think that they could do the work of junior engineers, they are accustomed to that now.

6279. If the engineers in the service, over 35 years of age, or of that age, were allowed to retire upon the pension or retirement now due to them, do you think that any of them would go?—I think that very few would go.

6280. What retirement do you think they would look for?—I think that those who had been for over 15 years in the service as engineers would expect the rate of 6d. a-day for every year's service, as an inducement for them to give up their future prospects.

6281. Do you think on that scale that sea and harbour service should count the same?—Yes; because in that case harbour service would really mean harbour pay.

6282. You say that they should have 6d. a-day for every year's service; should their every year's service in harbour count the same as every year's service at sea?—Yes, if borne on the books of a commissioned ship.

6283. Why should it be so, when it is not the case with other classes in the service?—I have not gone into the case of other classes.

6284. At the same time that you would recommend retirement for the engineers at the rate of 6d. a-day, would you increase the pay of engineers on the top of the list also?—I think that the pay of those serving on the list ought to increase in accordance with their length of service, if they have no chance of promotion and are not allowed to retire under a certain age.

6285. Therefore you would increase their pay?—Yes.

6286. Would not that be an inducement for them to remain in the service instead of retiring?—I think not, after a certain amount of time, say twenty years.

6287. Do you think that if any of them over the age of 40 were compelled to retire they would feel it a hardship?—Hardly, if they had 6d. a-day for every year's service. I think that a retiring allowance of 10s. a-day would compensate them. They would have to serve as junior chief engineers in small ships, and the pay would hardly be better; they could never get more than 16s. a-day full pay; and if they could retire on 10s. a-day, I think they would give the preference to it.

6288. Supposing that when they retire it was made a condition that they should serve the navy

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again in case of war, or on an emergency, do you think that that would to any extent check their retirement?—I think that very few would take it under those circumstances.

6289. It would be a great check?—Yes.

6290. What method would you suggest of getting engineers for the navy in time of war?—If any additional engineers were required, I think it would be almost impossible to get them from any other source than the private trade.

6291. Considering the number of ships that would be in commission, and that treble the number of engineers would certainly be required, have you any idea where we should be able to get them from?—No; not at the rate of pay at present given in the navy, because the private firms, or owners of merchant ships, would offer a larger inducement for them to serve. Men would be required for the merchant service as well as for the navy.

6292. You mean that the way to get them would be to offer them higher pay, and to enter them temporarily?—Yes, that would be one inducement.

6293. Do you think that the pay which is given now to engine-room artificers is sufficient to induce good men to remain in the service?—I think not.

6294. What would you suggest?—I would suggest that their pay should be increased in accordance with their length of service, according to all other branches of their own ranks; the chief petty officers have an increase of pay according to their rating, but an engine-room artificer has no chance of rising.

6295. What pay do you think an engine-room artificer would be worth at the end of 10 years' service?—I think he would be worth 7s. a-day for re-entry.

6296. Looking to the other advantages, and the pension in prospect, do you think that that would induce him to re-enter for another 10 years?—With a further increase of 1s. a-day at the end of another five years I do.

6297. Have you heard of any complaint on the part of the engine-room artificers as to their treatment and position on board ship?—In every ship that I have served in they have complained.

6298. Of what?—Of having to do a great many things which they have not been used to do when on shore, one is scrubbing their mess; and they complain also of the size of their chest. In the "Wolverene" the engine-room artificer had no complaint, he had the same size chest as the junior officers. Now the chests are limited to a small size, and continual complaints are heard about it; and also with regard to the hammocks, the engine-room artificers have to pay hammockmen now to scrub their hammocks or to do it themselves.

6299. Has not every one to do that in the ship?—The master-at-arms has a boy told off for that, and the ship's steward has a boy generally who does it for him; but the other chief petty officers do it for themselves.

6300. What do the engineers do?—They have hammockmen told off, generally stokers, and they pay those men according to the Admiralty circular.

6301. Why, then, considering their high rate of pay, should the engine-room artificer be excused?—Their pay at present can hardly be called "high."

6302. Is it not higher than that of the chief petty officer, who has served his country for 20 years, a chief gunner's mate, for instance?—An engine-room artificer's pay is higher than theirs, because he has a trade which will always command a higher rate of pay in the market.

6303. Therefore cannot they, out of that higher pay, afford to pay a hammockman?—Not at the present rate of pay, because they received the same rate of pay on shore, or even a higher rate, and had no hammockman to pay out of it.

6304. Are you aware that they generally belong to trade unions when on shore?—I know nothing about that.

6305. And they pay their trade unions the same

as they pay hammockmen on board ship?—They may still continue to pay that on board ship, that would make no difference.

6306. Would it be of any advantage to belong to a trade union when in the navy?—I think not, unless their families were benefited by it; but I do not know anything about trade unions.

6307. (*Captain Dowell.*) You say that the engine-room artificers have not a high rate of pay?—Not in comparison with the pay that they would receive on shore, or if not serving on board ship.

6308. What would they receive on shore?—The average pay of a workman in the factories, is from 5s. to 7s. a-day; from 5s. on first entry, to 7s. after some time in the factory; that is both in the private trade, and in government factories.

6309. Take 6s. a-day as the medium, that is exactly the same on board ship, as 7s. a-day on shore?—It would not be worth more than 5s. a-day on board ship, because they have a uniform to keep up, and other expenses to incur. The mess on board ship is not kept up simply by the allowance which they receive; they have to pay something towards their messing.

6310. Have they not to feed themselves on shore?—Yes, but their families consume part of it, and it is cheaper to live on shore, than to support a family on shore and keep their mess up on board ship at the same time; there are the additional expenses which they are put to on board ship.

6311. You mean to tell me that if two people are receiving each 6s. a-day, the man having extra rations on board ship is worse than the man with 36s. a-week on shore without his rations?—I think it would cost him more to support himself in the service, than it would if he were living on shore with 6s. a-day.

6312. What pay do you think he should receive on board ship?—On entry 5s. 6d. a-day, which might rise to 7s. or 8s. a-day after so many years' service, according to the length of service.

6313. Do you think if they were certain of receiving 7s. 6d. a-day after ten years' service it would be an inducement for them to remain in the service?—Yes, a great inducement.

6314. Do you think that the pension is any inducement to them?—I think it would be, after they had completed their first ten years to re-engage instead of going into the merchant service or other employment, which they would be fully qualified for then; they would even be qualified to pass the Board of Trade for a second-class certificate if they had served in the navy for that time.

6315. You think that the pension would not be an inducement beforehand?—I think not, because they would have to serve the previous ten years.

6316. On first entry, the ultimate chance of a pension is not taken into consideration by them at all?—I think not much; they get into the idea of it after they have been for some time in the service.

6317. What pension do you think they should be entitled to at the end of 20 years' service?—I should think that 4s. a-day at the end of 20 years' service would satisfy them as a pension.

6318. (*The Chairman.*) Half their pay at that time?—Yes.

6319. Have you any remarks to make with reference to their uniform?—They complain themselves about their uniform; that they have to wear a jacket, and they would prefer having a coat similar to that of chief petty officers of the same rank.

6320. Do you know anything at all about the engineers in the merchant service?—Not during the last 13 years.

6321. What do you suppose would be the pay that one of these engine-room artificers would get as an engineer in the merchant service?—They would receive from £10 to £35 a-month as chief engineers.

6322. Do you suppose that these engine-room artificers would become chief engineers in the merchant service?—Yes, a good fitter would become a chief engineer in the merchant service if he remained in the same company sufficiently long.

6323. Where did the engine-room artificers in the "Wolverene" muster?—There was only one.

6324. Who had charge of the stokers for divisions?—The executive officers.

6325. How many engineers had you?—Three besides the chief.

6326. Where at divisions did the engineer officers muster?—On the quarter-deck.

6327. Had they nothing to do with their own men?—Nothing to do with the men at divisions.

6328. (*Captain Commerell.*) You think it is more a question with the engine-room artificers of comfort on board ship than anything else?—Yes, comfort and more pay.

6329. Do they think more of the present pay or of future pension when they enter the service?—The present pay is the principal inducement, but they take both into consideration; they only have a proper idea of the pension after having served some time; it is not their principal inducement on entering the service.

6330. They think more of the pension on re-entry at the end of 10 years?—Yes.

6331. Then they think it is something worth getting at?—Yes, because then they have only a comparatively short time to serve for it.

6332. At what age do you consider that an engineer ought to be made a chief engineer?—Certainly at not later than 35 years of age.

6333. What is your idea with respect to junior time?—I think that all time should certainly count after they join the service, because they join it at a sufficient age for that; at the present time the age of an engineer on joining is from 21 to 22 years.

6334. And you think that all time from first entry into the service should count?—Yes.

6335. And not have to wait until a man has been 11 years chief engineer?—No. If promoted at 32 years of age, it would be no bar to getting the higher rate of pension, which at present they cannot obtain, as they cannot get 11 years' time in under any circumstances. If promoted at 32 years of age, Mr. Childers' scheme would then act with reference to engineers the same as in any other branch of the service in which they have promotion at an earlier age.

6336. From your experience of engine-room artificers, do you think that, provided the pay be increased and certain advantages be given to them, we could get a competent class of men to take charge of the engine-room watch in a vessel of the same class as the "Wolverene"?—Certainly, I think with a proper selection you could; our engine-room artificer actually had charge of the watch on certain occasions.

6337. (*Mr. Wright.*) What is your feeling with regard to the maintenance of a separate mess for the engineers on board ship?—I think that by doing away with the engineers' mess, the engineers would be much benefited, and the service likewise.

6338. Do you think that a great number of them would be able to support the additional expense of a ward-room or gun-room mess?—I think that they might support the expense of the gun-room mess on their present pay, that is to say, the junior ranks, but it would be necessary to increase the pay in the senior ranks.

6339. Do you think it would be desirable to put engineers, who are men of a considerably greater age than the gun-room officers, to mess with those officers?—I think the senior engineers would be benefited by going into the ward-room, and the junior engineers only should go into the gun-room.

6340. Do you propose to make that change at once, or gradually?—There are some 300 engineers about

the top of the list, whom I think might be induced within the next two or three years to retire, if a higher rate of retirement were given; in that case the number in the ship being reduced, at the same time I think the remainder might go into the ward-room and gun-room messes, and there would then be no crowding.

6341. (*Mr. Covey.*) You said that in the event of war we might get engineers from the merchant service if we gave a higher rate of pay?—I said if a greater amount of pay were offered than is at present the rate in the service that it would be the only thing to induce them to enter the navy at all for service; then they would be an inferior class of men, as the merchant service would pay higher wages.

6342. (*Captain Dowell.*) In the event of war would the merchant service pay higher than Her Majesty's service for engineers?—Yes, and they could only be got for our service by offering a larger amount of pay; but whatever amount of pay was offered in the navy, I think that the merchant service would out-bid us if they wanted the men.

6343. (*The Chairman.*) Are you aware of the class from which the engineer students are now taken?—I have heard a great deal about it lately.

6344. Are you aware that anyone is admitted into the service, the sons of dockyard labourers, and so on?—That is not in accordance with the Admiralty regulations; they distinctly say that the superintendents are to select candidates for engineer students from respectable parentage.

6345. Do not you think that a dockyard labourer, or a private of marines, can be a respectable man?—Yes, if you take it in that light; any circular may be so represented.

6346. Are you aware that that is the case, and that no limit is put upon the parentage of the candidates if they should be well conducted?—I believe that those who have entered the service lately have been well conducted whatever their extraction may have been.

6347. Are you aware that they are the sons of dockyard labourers, privates of marines, butchers, washerwomen, and so on?—Yes, I have heard so.

6348. That being the case, and those men living with their families for six years whilst in the dockyard, do you think that they are fitted to at once go into the gun-room mess?—From what I have seen of those who have entered, I think so. I do not know whether or not the superior class of education which they receive has given them a polish which they would not otherwise possess.

6349. Do you think that all which is required to go into the gun-room mess and associate with gentlemen is an outward polish?—The principle would be gained by mixing with the officers.

6350. As far as manners are concerned they would learn nothing?—The principle I said, whatever the manners may be.

6351. Do you think it would be satisfactory for the gun-room officers?—I think the gun-room officers would not object to it, with very few exceptions. I know that the gun-room officers in every ship I have been in have been a great deal in the engineers' mess, and the engineers have been a great deal in the gun-room officers' mess.

6352. At the time you entered the service this indiscriminate admission was not in vogue. Engineers had to educate themselves?—Yes.

6353. Do you think it would be desirable to have the candidates nominated, instead of their being indiscriminately taken?—If not nominated, a more careful selection should be made, I think.

Mr. T. W.
Ramsay, R.N.
5 Nov., 1875.

Mr. VALENTINE HORNE, R.N., called and examined.

6354. (*The Chairman.*) What is your standing as an engineer?—Ten years, December 4, 1855.

6355. Are you qualified for the rank of chief engineer?—No.

Mr. V. Horne,
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Mr. V. Horne,
R.N.
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6356. How long have you been in the service altogether?—Nearly 17 years.

6357. Why have you not qualified for the rank of chief engineer?—Because I hope to retire.

6358. What age are you now?—39, nearly.

6359. According to the present regulations, when shall you be able to retire?—In six years' time. Then I shall be 45.

6360. What retirement shall you get?—Then I shall get £130 a-year.

6361. Where did you serve your time?—At Southampton, in the West India Mail Company's steam factory.

6362. Did you join the service when out of your time?—Nine or ten months after.

6363. At that time when did you expect to be made a chief engineer?—I thought that I should be made a chief engineer after I had been some 10 or 12 years in the service.

6364. Was that the average age for promotion?—Yes, about 30.

6365. Did you serve your time in a marine engine manufactory?—Yes, in the dockyard at Southampton.

6366. If you were allowed to retire now, would you go?—My present retirement would be rather too small.

6367. What would you get now?—I should get about £92 a-year.

6368. Does all your time count?—Yes, at the rate of £6 a-year for every year served.

6369. If you were allowed to retire on 6d. a-day for every year served, that would give you £150 a-year?—Yes, it would.

6370. If you had that would you retire?—Yes, I think I would.

6371. If you were offered promotion to the rank of chief engineer immediately, or retirement on £150 a-year, which would you take?—I think, I should retire.

6372. What was the last ship in which you served?—In the "Vanguard."

6373. Were you in her when she was sunk?—Yes.

6374. Had you any engine-room artificers in the ship?—Yes, we had one permanent artificer and two lent for the cruise.

6375. What trades were they?—Two were smiths and one was a fitter.

6376. By "smith" do you mean engine-smith?—Yes, engine-smiths.

6377. Do you know where they learnt their trade?—I think that one came from this dockyard, Keyham, Devonport, and another from one of the engineering firms in Plymouth. I do not recollect the name of the firm.

6378. And the third was a fitter?—Yes.

6379. Which do you think is the more useful trade to have in a ship?—Either a fitter or an engine-smith. I have been shipmates with boilermakers, engine-smiths, and fitters, and I found in two cases that the engine-smiths were very good men; besides being good smiths, they were able to work as coppersmiths and turners.

6380. Could they do any boilermaker's work?—Yes, they could do boilermaker's work if it were necessary.

6381. A good deal of that is smith's work I suppose?—Yes.

6382. Have you been in a small ship with engine-room artificers?—I have not.

6383. Have you ever seen engine-room artificers who were capable of keeping a watch in the engine-room?—In small ships I have heard of its being done, but I have never witnessed it myself.

6384. Do you think it would be for the benefit of the service, if the number of engineers were reduced, and the number of engine-room artificers increased?—Yes, I think so.

6385. Do you think that an engine-room artificer could well take the duty of the junior engineer in a ship?—Yes, unless in a large ship; when watch keeping, then it would be necessary, I think, for an engineer to have supervision during the watch.

6386. You mean that there should always be an engineer in charge of the watch in large ships?—Yes.

6387. The engine-room artificer might do duty in the stokehold?—Yes, which he does at present.

6388. Were you senior engineer in the "Vanguard"?—I was.

6389. Did you ever have to take part in the manual repairs?—Yes, simply because the work had to be done, and there was no one else to do it but the engineers. My being employed did not always occur, but only occasionally, when the ship had to be got ready for sea.

6390. From your experience of the "Vanguard" at sea, what do you think should be the engine-room complement of that ship, both engineers and engine-room artificers?—Six engineers and three engine-room artificers; we had that complement during the time that I was in her.

6391. On the understanding that there might be fewer engineers, and more engine-room artificers, what complement would you suggest for that ship?—I should think, four engineers and six engine-room artificers.

6392. You would add one more engine-room artificer to the full complement?—Yes, I should think work might be found for him.

6393. (Captain Dowell.) But it is not absolutely necessary?—No.

6394. (The Chairman.) Had you charge of the double-bottom and watertight doors in the "Vanguard"?—I had the general supervision of them, but there was an engineer specially appointed to take charge of and examine them, and they were completely under his control.

6395. Have you any suggestions to offer to the Committee with regard to any improvement in the condition of the engine-room artificers, which you think would be requisite to enable us to ensure getting good men, and retaining them in the service?—The few that I have met with of the present class of men have been very good workmen, but they seem rather dissatisfied in some cases with their treatment, I have heard them complaining about mess matters, and one thing and the other.

6396. Do you think that their complaints are reasonable?—I think in some cases it may be their own fault. I have sent for an engine-room artificer and wished to know the reason why he has not been in the engine-room at the proper hour, and have been informed that he was obliged to remain to see that his mess was properly scrubbed and cleaned.

6397. Do you think that by any arrangement that might be avoided?—In some cases I suppose they arrange it themselves; they get some one to do that work for them by paying for it. I do not know whether any man or boy is allowed for doing that duty.

6398. Would you recommend that they should mess by themselves or with the other chief petty officers?—I think that they would be quite contented to mess, as they do at present, with the schoolmaster and writer, and other chief petty officers.

6399. Do you think that they would be contented with that?—I think so. I have not heard them complain of their messmates.

6400. Have you had any experience of the young engineers in the service, those who have lately joined?—We had one of them with us for a few weeks during the cruise in the "Vanguard."

6401. What was his standing?—He was an acting second-class engineer; his name was Fellow.

6402. What did you think of him? Was he able and willing to do his work?—Yes; I think he was a most energetic young officer, and always endeavoured to do his work. He asked permission even to keep an engine-room watch, but it was not granted, although he was allowed on his watch off to keep a watch with the engineer of the watch, in order to gain experience.

6403. It did not appear that his high education stood in his way with regard to his work?—I think not. He kept a stokehold watch during the cruise.

There was an engine-room artificer as well with him there.

6404. (*Captain Dowell.*) Are the engineers generally satisfied with the mess arrangements on board ship?—In some ships they are more satisfied than they are in others; that is, in the new class of ships, where they have a very good mess berth.

6405. Do you call the "Iron Duke" a new class of ship?—Yes; and the "Vanguard," and "Achilles," and that class of ship.

6406. Then they would not care to be moved into the ward-room?—Yes, they would, for other reasons, not on account of want of accommodation. They complain of their position, and not of the want of accommodation.

6407. Would not the ward-room mess be much more expensive?—Yes, very much more so; and I dare say many of the married engineers would dislike it on that account, at their present rate of pay.

6408. Do you think that the engineers generally object to being "pensioned" instead of being placed on the retired list?—Yes, I do.

6409. Do you think it would meet the wishes of the engineers generally if that were altered?—Yes.

6410. What you want is to be kept in the navy list; the money value is not different?—Quite so; that is it, to substitute the word "retired" for "pensioned."

6411. (*Captain Commerell.*) From your experience of engine-room artificers, do you think that there would be any difficulty in making them contented on board ship, provided there were rules laid down so that their treatment in each ship should be similar?—I believe that they would be very much more satisfied than they are at present if a few little details were attended to with regard to their position in the ship, and their messing, and so on.

6412. We have had it in evidence, from the engine-room artificer of the "Vanguard," that his principal complaint was with regard to his treatment by the master-at-arms. Did you observe anything to lead you to suppose that the police were down upon the engine-room artificers?—No.

6413. Do you think that they received similar treatment to that which the other chief petty officers received?—Yes, I think so; I have had no reason to think otherwise.

6414. Do you think that the engine-room artificer was a man that was annoyed at little things?—He was not a good-tempered man; hasty, but very hard-working.

6415. Do you think that they might get on better on the lower deck if there were a little more of that give-and-take principle on both sides?—Yes, I think so. With regard to those questions in dispute, perhaps the engine-room artificer would want leave, and if he were not on very good terms with the master-at-arms, the chances are that the master-at-arms would not go to the commander at the time, and, if he put it off too late, the opportunity would be lost. All things of that

kind they complain of, although I have had no complaints made to me.

6416. Will you just look at that statement (*handing a pamphlet to the witness*), and give me your opinion as to whether it is reasonable or unreasonable?—It is unreasonable in some respects.

6417. Do you think it would be better and more practicable to let the engine-room artificers mess by themselves, and to keep them more exclusively under the control of the chief engineer, than to give them relative rank with other chief petty officers?—As they are at present, relative to their rank, I see no reason for them to complain. They always have a place for study in a large ship, if they choose to avail themselves of it. There is a place set apart as a reading room, and there is generally plenty of room there for them.

6418. Have you ever found in your experience on board the "Vanguard," that the engine-room artificers have been unreasonably interfered with?—No, perhaps I may not know the circumstances throughout, for I have not asked them any questions about it.

6419. Would your general observations lead you to infer that such was the case?—I do not know upon what terms they are with their messmates, or the master-at-arms or other chief petty and petty officers, but as far as my observation goes they appear to be friendly enough, and I have never heard them complain in that respect. There is one thing about which I have heard them complain, and that is their chest.

6420. Do you consider that the chests are large enough?—I think from what I recollect of the chest that it is rather small for their requirements; very often those men have private tools which they keep in one part of their chest, and carry about with them from ship to ship.

6421. It would be a good thing to encourage that?—Yes, little tools for tinsmith's work, and so on; that would be handy to them for some work.

6422. Which, having made themselves, they no doubt value?—Yes.

6423. At what age do you consider that an engineer should be promoted to the rank of chief engineer if practicable?—At about from 30 to 32 years of age.

6424. If you reduce the number of engineers, and substitute for them engine-room artificers, do you think that in case of war, the list would be sufficiently elastic to enable us to find engine-room artificers and engineers sufficient to work a large increase to our fleet in commissioned ships?—I can hardly answer that question, but I think perhaps not.

6425. From your experience, should you think that we could get an eligible class of engineers from the merchant service for temporary purposes?—Yes, I daresay you would be able to obtain them; but I know very little of the merchant service; it is 18 years ago since I spoke to any merchant service engineer.

(*The witness withdrew.*)

Mr. JAMES FROST BABB, R.N., called and examined.

6426. (*The Chairman.*) What is your standing as an engineer?—Four years and three months.

6427. In what year?—In September, 1871.

6428. Where are you serving now?—In the "Hydra."

6429. How many engineers are there in her?—I am the only engineer.

6430. When did you enter the service?—In August, 1866.

6431. Were you an engineer student?—Yes.

6432. When did you first enter as an engineer student?—I entered as an engineer boy in the year 1861.

6433. And in 1863 you became an engineer student?—Yes.

6434. And in 1866 you were appointed an assistant engineer?—Yes.

6435. Were all the engineer boys at that time transferred as engineer students?—Yes.

6436. What certificate did you take?—A first-class certificate.

6437. In taking a first-class certificate, what advantage did it give you?—twelve months sea time, in regard to promotion only.

6438. Will that twelve months sea time count for you always?—No.

Mr. V. Horne,
R.N.

5 Nov., 1875.

Mr. J. F.
Babb, R.N.

5 Nov., 1875.

Mr. J. F.
Babb, R.N.
5 Nov., 1875.

6439. When will it not count?—Neither for full, half, nor retired pay.

6440. You have got that year for ever?—Yes, in seniority only.

6441. Supposing you remained a chief engineer for 11 years, then it would count?—No.

6442. When you passed out, were there any South Kensington students established?—Yes.

6443. Did any of your batch of students go to South Kensington?—No, none.

6444. Why not?—Because they failed to pass the examination.

6445. I thought that three or four went up every year?—I do not know whether any in my batch passed from other yards, but they did not from Keyham.

6446. What was your last ship?—The "Nimble."

6447. Had she a chief engineer?—She had an engineer in charge.

6448. And yourself?—And another besides myself.

6449. Had she any engine-room artificers?—No, none at all.

6450. Was not she allowed any engine-room artificers?—No.

6451. Did you do any repairs that were wanted?—Yes, myself and the other engineer; for five months we were watch and watch, and had to do the whole of the repairs and the watch keeping as well.

6452. Have you any engine-room artificers in the "Hydra"?—No.

6453. Is that because you are in the reserve?—Yes.

6454. Have you ever been shipmates with engine-room artificers?—No.

6455. Have you any experience of their work here in the dockyard?—No.

6456. Do you think it is likely that if we want more engine-room artificers we shall be able to get them?—When they have better advantages.

6457. Why should they have better advantages, when, with the present advantages, we can get as many as we require now?—If you reduced the number of engineers you would want more.

6458. Still we can get more men than we want now?—Yes, of a certain class.

6459. From all accounts they are very good?—I do not think so.

6460. Do you think that they will remain in the service?—I think that the great bulk of them will leave at the expiration of their first ten years service.

6461. That is unless their pay be increased?—Yes, and their position improved.

6462. Therefore it is not in getting them, but in retaining them in the service which is the difficulty?—I dare say it is.

6463. When you entered the service, how long did you expect to be before you were made a chief engineer?—I thought there was a possibility of it after I had been 15 years in the service, but now I see no possibility of it.

6464. Were you at school at all as an engineer boy in the dockyard here?—Yes.

6465. Before you became a student?—Yes, but it was voluntary then, I attended the school voluntarily.

6466. Where do you mess in the "Hydra" now?—There is no mess at all.

6467. What do you do?—I live on shore.

6468. Are you a married man?—Yes.

6469. Do you think the present progress of promotion amongst the engineers is satisfactory?—No.

6470. What would you suggest to improve it?—We want a fair flow of promotion; the engineers want progressive pay, and an increased retiring allowance; an engineer now would never receive more than 10s. a-day had he been 25 years in the service, or more.

6471. If there be very much earlier promotion given, would not that be one remedy at all events?—

Yes, if you could guarantee promotion at from 30 to 35 years of age I dare say it would be.

6472. That is the age at which you think a man ought to be promoted to the rank of chief engineer for good service?—Yes.

6473. What service have you got altogether now?—Nine years and three months.

6474. Supposing at the end of three years you were offered to be made a chief engineer or retirement on 6d. a-day for every year's service, which would you take?—I would take the rank of chief engineer.

6475. At your age you think it would be the best thing for you?—Yes, certainly.

6476. You would have no hesitation about remaining in the service?—No, not the slightest.

6477. Have you served in a big ship?—I have never served in a ship larger than the corvette class, the "Raccoon."

6478. Where did you mess in the "Raccoon"?—In the engineers' mess.

6479. Would you like to retain the engineers' mess or would you rather be transferred to the ward-room mess or gun-room mess?—I would rather be transferred to the ward-room or gun-room mess.

6480. What is your age now?—I am 29 years old.

6481. Now with your rank as engineer, and having had four years in that position, do you think that you would be entitled to go into the ward-room or gun-room mess?—Yes, into the ward-room mess.

6482. Is not that a great jump for you?—You must of course draw the line somewhere, and I think, for instance, that if a young fellow messed in the gun-room for the first five years, and after that time went into the ward-room mess, it would be better.

6483. What pay did you receive as an engineer boy?—8s. a-week.

6484. Was that about the same pay as the engineer students get?—It is the same as they get now.

6485. How were you admitted as an engineer boy?—By nomination first, and competitive examination afterwards.

6486. From whom did you obtain your nomination?—From the Secretary to the Admiralty.

6487. Then when you were in the dockyard in 1863, the regulation for the indiscriminate entry of engineer students was established?—Yes.

6488. Do you think that that indiscriminate entry has been a good thing for the service?—No, not at all.

6489. What would you suggest instead of it?—Nomination by the Board of Admiralty.

6490. Do you think that that indiscriminate entry has been a great bar to introducing the men into the gun and ward-room messes?—Yes, I do.

6491. Have you any opinions or suggestions of your own to give to the Committee besides those which we have already discussed, with regard to the position of the engineers in the service; would you increase their pay on first entry into the service, or after being a certain time in it?—Yes, I think it should be increased on entering the service.

6492. Do you think that 6s. a-day is not enough for them?—No, it is not enough for them; it is not their market value, and I think it should be increased to 7s. a-day.

6493. When you speak of "market value," must not you consider, not the actual day's pay, but the position and prospect which the men will have; I do not say as the engineers are now, but as you would like to see them, progressive pay and quick promotion to the rank of chief engineer, and to be introduced into the ward-room mess; would not that be a good return for the supposed loss in their market value. Is there any other service where they could get such a good retiring pension as they might get in the navy, and is not that pension a great point with them?—Yes, the pension is a great point, or "retirement," I should say, not "pension."

6494. Permanent employment, with a progressive rate of pay and other advantages?—With that conceded, I would waive an increase of pay on entry.

6495. (*Captain Commerell.*) Are you a married man?—I am.

6496. (*The Chairman.*) Have you come in contact lately with any of the young engineers who have come from Greenwich?—Yes, I have.

6497. Have you been shipmates with them?—I have not been shipmates with them, but I have met them in the Reserve here.

6498. Do you think that the mess at Greenwich is a popular thing with them?—I do not think so.

6499. What would they wish?—They would wish to be in a general mess, and to abolish the engineers' mess.

6500. Do you think that, when you get boys who are the sons of privates in the marines, and dockyard labourers, and washerwomen, and butchers who are living with their families, for six years, it is in any way possible, or I will say expedient, to put them straight into the senior officers' messes?—Those boys, if they have been for six years in the factory, have, while there, received a very superior education, and that tends to refine them.

6501. But they are living among their own brothers and sisters at their own homes at the same time. I do not speak of the whole of them, but only a proportion; and the weight of the residuum must break the others down. Do you think it is possible those men could be indiscriminately admitted into the senior officers' messes?—I think if that were to be taken into account, the many must suffer for the few in that case. If they could be admitted into the general mess at the college, after they have been at the college for one session, do not you think that they are then fit to go into the gun-room mess?

6502. (*Captain Dowell.*) Do you know anything about the engineers in the merchant service?—I have never met with any in the merchant service.

6503. Do you think it is a great object with engineer officers that they should be "retired" instead of "pensioned"?—Yes, most decidedly.

6504. (*The Chairman.*) Why?—Because then they would be placed in the same position as other officers of relative rank, and they would appear in the Navy List, and would not, as is now the case, have to appear at the dockyard with ships' cooks and other pensioners in order to receive their pensions.

6505. (*Captain Commerell.*) You have not, I think served in any ship lately where there has been a gun-room mess?—No, there was no gun-room mess in the "Nimble."

6506. What ship were you in before the "Nimble"?—The "Raccoon."

6507. Where was she?—At the Cape of Good Hope and West Indies, with Captain Purvis.

6508. (*Mr. Covey.*) Have you had any experience of engine-room artificers afloat?—No.

6509. I suppose you have seen a good deal of them on board the "Calliope"?—Yes.

6510. What do you think of them?—I think they are average workmen.

6511. Do not you think that after an experience at sea they would be fit to take charge of a stokehold watch in large ships?—Yes, a stokehold watch.

6512. How far would you allow them to go in charge of a watch; in what size ship?—In a ship not larger than the "Dryad" or "Daphne" class.

6513. (*The Chairman.*) That is in charge of the engine-room?—Yes, in charge of the engine-room.

6514. You think that it would be advisable to reduce the number of engineers in the service and replace them by engine-room artificers?—Yes.

6515. You know of no other way of getting quicker promotion?—No.

6516. (*Mr. Covey.*) Would you have liked to have had engine-room artificers in the "Nimble" instead of three engineers?—In the "Nimble" two engine-room artificers and one engineer, in addition to the engineer in charge.

6517. (*Captain Commerell.*) What age do you expect to be before you are made a chief engineer?—I have no chance under 20 years; I am 29 years of age now; I should be 49 before I had a chance, and I can retire at 45.

Mr. J. F.
Babb, R.N.
5 Nov., 1875

(*The witness withdrew.*)

[Adjourned to Tuesday, the 16th instant, at 12 o'clock.]

TUESDAY, 16TH NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

GEORGE FULLERTON BELL, Esq., R.N., called and examined.

6518. (*The Chairman.*) What position do you hold?—I am chief engineer of the "Opal."

6519. What is your standing as chief engineer?—1870; five years next month.

6520. What is the indicated horse-power of the "Opal"?—2,100 horses.

6521. What vessel were you in last?—The "Vigilant" despatch vessel.

6522. In charge?—As chief engineer.

6523. What complement of engineers shall you have in the "Opal"?—Three engineers and one engine-room artificer.

6524. Are they selected yet?—No, but there is one assistant-engineer appointed.

6525. What trade of engine-room artificer should you like to have?—A fitter.

6526. Had you any engine-room artificers in the last ship you were in?—No.

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6527. Have you ever been shipmates with any engine-room artificers?—Yes, in the "Crocodile."

6528. What position did you hold in the "Crocodile"?—I was senior engineer in her.

6529. For how long?—For three years and four months.

6530. How many engine-room artificers had you in her?—Three in her.

6531. What duties did the engine-room artificers perform?—They kept the stokehold watch.

6532. All of them?—Yes.

6533. On any occasion did they do duty in the engine-room?—Not while I was in her.

6534. Did they know their work well?—Yes.

6535. What trades were they?—Two boilermakers and one fitter.

6536. Did they all know their work equally well?—The boilermakers knew their work better than the fitter.

6537. Do you mean that they did their work better in the stokehold, or that they knew their own trade better?—They knew their own trade better.

6538. Where did the fitter come from?—I do not know.

6539. Was he a fitter by trade, or had he entered as a stoker?—He was a fitter by trade.

6540. Are you aware whether he came from the private trade, or from a government factory?—From the private trade.

6541. Where did the boilermakers come from?—They came from a government yard.

6542. Which dockyard?—Portsmouth.

6543. What age were you when you were made a chief engineer?—Thirty-seven and a-half.

6544. Did you obtain your promotion by seniority?—Yes.

6545. When did you enter the service?—In 1854.

6546. Where did you serve your time?—At Messrs. Napiers, in Glasgow.

6547. You came direct into the service as a third-class assistant?—Yes, as a third-class assistant.

6548. When you entered the service after what time did you expect to be made a chief engineer?—I thought in about from eight to ten years.

6549. Was that the average time at that period?—No, I do not think that; I took it from the Navy List; the time in each grade.

6550. When you entered the service was that the average time by the Navy List in which men were made chief engineers?—I reckoned the time in each grade, and that made it about 10 years.

6551. Did not you observe by the Navy List that engineers were not promoted to chief engineers until a longer time than that?—I did not.

6552. Do you think that the young engineers of the present day are as good practical workmen as they were when you entered the service?—I do not think so.

6553. Which do you think are the better workmen the engine-room artificers or the young engineers?—I should say the engine-room artificers.

6554. As you have been so much longer than you expected in reaching the rank of chief engineer, have you ever thought over any plan that might be adopted in order to expedite the promotion of engineers?—Yes I would reduce the number of engineers, and put engine-room artificers in their places.

6555. What advantage would you derive from that?—Quicker promotion.

6556. Do you think that an engine-room artificer would be capable of taking charge of the engines of a small vessel?—Yes.

6557. In the "Opal" whom will you have to keep watch?—Three engineers.

6558. What steps shall you take to train the engine-room artificer to take charge of the engines and keep watch?—I shall let him keep a stokehold watch with one of the engineers.

6559. To begin with?—Yes.

6560. Should you think it desirable to train him in

the charge of the engines in case one of the engineers should become sick?—Yes.

6561. What trades of artificer do you think it would be most desirable to enter in the service?—Fitters, boilermakers, blacksmiths, and coppersmiths.

6562. Who did your blacksmith's work in the "Crocodile"?—The boilermaker.

6563. Had you no blacksmith amongst the stokers?—No, none.

6564. Did you ever make use of the ship's blacksmith?—I do not think so.

6565. Have you ever been shipmates with a stoker mechanic blacksmith?—Yes.

6566. Do you think you would elevate the trade of a blacksmith to the same rank as that of a fitter?—I think so.

6567. Do you distinguish or recognise any distinction between an engine-smith and a blacksmith?—An engine-smith is a better smith than a common smith.

6568. When you take blacksmith artificers, would you like to specify engine-smiths?—Yes.

6569. Are you acquainted with the mode of practical training of the engineer students in the dockyards?—Yes.

6570. Is there any suggestion which you would like to make with regard to it?—I think that their practical training ought to be more looked after than it is; I mean the mechanical part of their training.

6571. Do you know any point of detail that you would specify?—No.

6572. Where did you mess in the "Crocodile"?—With the engineers.

6573. Where did the chief engineer mess?—In the saloon.

6574. With all the other officers?—Yes.

6575. Are you aware of the system adopted now for entering engineer students?—Yes; by competitive examination.

6576. Do you know whether any selection is made in order to see that they come from respectable families of good social position?—I believe that there is some certificate which they have to give proving that they come from respectable families.

6577. Do you consider that the social class from which they are drawn is a satisfactory one?—No; I do not.

6578. What change would you suggest?—That they be appointed by nomination.

6579. Had you any difficulty with the engine-room artificers with regard to their treatment on board, or were they discontented at all?—Yes; they were.

6580. At what?—They had no servant to attend to them, unless the chief engineer allowed one of the stokers to do so, and he always did so that he might have the services of the engine-room artificers all day.

6581. Then, if they had the assistance of a stoker to clean their mess, they had nothing to complain of?—They had no mess-place.

6582. Where did they mess?—On the lower troop deck.

6583. With whom?—By themselves.

6584. What alteration would you suggest in that?—I would suggest that they should have a mess-place to themselves, or that they should mess with the chief petty officers.

6585. Had the chief petty officers a mess place to themselves?—Only the master-at-arms.

6586. Then if they messed with the chief petty officers they would not be better off than they were, otherwise would they because the others had no mess to themselves?—In most ships the master-at-arms has a mess place to himself, and the ship's corporals are allotted to those messes.

6587. Have you any suggestion to make with regard to the pay of your own class, the engineers and chief engineers?—I think that the pay of the engineers ought to be increased periodically, and the pay of chief engineers increased.

6588. According to their service?—Yes.

6589. What pay had you in the "Crocodile"?—9s. a-day for the first part of the commission, and for the last six months 10s. a day.

6590. That is the highest pay that you could reach as an engineer?—Yes.

6591. Were you promoted from the "Crocodile"?—I was promoted shortly after I left her.

6592. What age were you when you received 10s. a-day?—I was between 37 and 38 years of age.

6593. Has the "Opal" any compartments?—Yes, six compartments, and several small compartments within those.

6594. Has she any double bottom?—No.

6595. To whom do you intend to give the charge of the watertight doors?—To one of the engineers.

6596. How are they closed?—All those on the lower deck close upon hinges and catches with a bolt, but some of the others are sliding perpendicular doors and some horizontal.

6597. Where is the winch work for closing them? On the upper deck.

6598. Do you know when the doors are close shut by a mark of the handle?—There is a tell-tale upon the top; it is a screw upon which a small pin works, and as the pin works up so it turns the tell-tale.

6599. How many turns of the screw does it take to shut the door?—A good many; it takes a man three minutes to shut the screw passage door.

6600. Where will your engine-room artificer mess in the "Opal"?—There is no place for him specially; in one of the lower deck messes, I suppose.

6601. Supposing you wished to make him fairly comfortable in the "Opal," where should you suggest that he should mess, of course taking into consideration the requirements of the rest of the ship's company?—I should say that he ought to mess with the master-at-arms; the master-at-arms has a cabin.

6602. (Captain Dowell.) Has the "Opal" got a seaman schoolmaster?—I do not know.

6603. (The Chairman.) Do you think it is likely that the engine-room artificers and the master-at-arms would be likely to get on well together in one mess?—Yes, I think so; I do not see any reason why it should be otherwise.

6604. Bearing in mind that what the engine-room artificers seem to consider most, is that when they come dirty out of the engine-room, and before they clean themselves thoroughly, they should have some place in which they could lie down and be perfectly at ease, without being distressed by anybody, is it likely that the master-at-arms could allow that?—Certainly not; the engine-room artificer ought to be clean.

6605. But they say that they are so tired that there is not time to clean themselves before each meal?—I cannot speak to that.

6606. Where would the engine-room artificer wash?—In the stokers' bath-room.

6607. How many stokers shall you have in a watch?—Four stokers and one leading stoker in a watch.

6608. Do you contemplate being able to make any arrangement by which the engine-room artificer shall have a means of washing in the bath-room before the stokers go there?—I do not think there are any means.

6609. Have the engineers got a wash place too?—Yes.

6610. Is the engine-room artificer that you will have, yet told off for you?—No.

6611. (Captain Dowell.) With regard to the mess of the engineers, in your ship how many engineers shall you have?—Three.

6612. Do you think that the engineers generally would like to be moved into the ward-room mess?—I believe that they would like to mess in the gun-

room when they first join and to do away with the engineers' mess altogether.

6613. Do you think that is possible with the present class of officers; you know the source from which they are recruited?—Yes, I think so.

6614. Do you think that it would do to put them into the gun-room?—Yes.

6615. Do you know the social class from which they are generally taken?—Yes.

6616. Do you think that if the students were entered by nomination instead of by open competition that a higher class of men, socially, would enter?—Yes, I think so; I think that many men in the middle classes would enter their sons.

6617. Do you mean clergymen and that class?—Yes, and many officers too.

6618. (Mr. Wright.) Would you inform the Committee what sort of training the pupils at Messrs. Napiers in Glasgow receive, the shops they went through, and the kind of work upon which they were employed?—I was in the fitting and erecting shop first, and then I was in the turning shop and drawing office also.

6619. And were you employed on board ship to put in the machinery?—Yes.

6620. (The Chairman.) For how many years did you serve there?—Five years.

6621. (Captain Dowell.) Did you come direct into the service from there?—Yes, direct into the service.

6622. (Mr. Wright.) Do you know the particulars of the training given to our engineer students?—I know that they are put into each of the shops.

6623. Do you think it is as good a training as you and others received at Messrs. Napiers?—I do not think that the engineer students are kept so constantly at work.

6624. (Captain Commerell.) When you left Messrs. Napiers were you sufficiently instructed to be able to go straight on board ship and drive marine engines?—No.

6625. Where did you learn to drive them?—On board ship.

6626. Do you consider that our engineer students when they first come on board ship are sufficiently instructed in the actual working of marine engines?—For taking charge of a watch I do. I think it is the best training that they could have if they were made to go into the practical part of it more; I mean the training they receive in the dockyard.

6627. Do you mean practically as far as fitting is concerned, or as far as driving is concerned?—As far as fitting is concerned; the mechanical part of the work.

6628. (The Chairman.) For conducting repairs?—Yes.

6629. When you were in Messrs. Napiers' works, were you instructed by anybody in the shops, or were you merely under the general supervision of the leading man in the shops?—Under the general supervision of the leading man, that was all.

6630. Did you take part in the general and ordinary work of the shop?—Yes.

6631. You did not undergo any special instruction?—No, except that which I had at home.

6632. Were you paid anything during those five years?—Yes.

6633. What did you receive?—5s. a-week for the first year, and it increased 1s. a-week each year afterwards.

6634. At the end of five years you were receiving 9s. a-week?—Yes, 9s. a-week.

6635. Did you pay any premium on going in?—No, none; they did not take premiums for apprentices at Messrs. Napiers.

6636. Was that general, or were you an exception?—It was general.

6637. Did you work in the boiler-shop at Messrs. Napiers?—No, not at all.

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Esq., R.N.
16 Nov., 1875.

6638. Your training was, as you say, limited to fitting, turning, and drawing?—Yes.

6639. Did you do any smiths' work?—No, not unless I did it for my own amusement.

(The witness withdrew).

[Adjourned to to-morrow at 12 o'clock.]

WEDNESDAY, 17TH NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., J.C.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

ORESTES N. BROOKER, Esq., R.N., called and examined.

O. N. Brooker,
Esq., R.N.
17 Nov., 1875.

6640. (*The Chairman.*) Where are you now serving?—I belong to the "Asia," for service in the floating factory at Portsmouth.

6641. Are you in charge?—Yes, of the "Volcano."

6642. Where was your last service at sea?—On board the troopship "Crocodile."

6643. How long were you in her?—For 4½ years.

6644. What pay do you receive now?—22s. a-day.

6645. At what age were you made a chief engineer?—At nearly 30 years of age, but I was very fortunate.

6646. Where did you serve your time?—In the service.

6647. What did you enter the service as?—As an engineer apprentice.

6648. In the dockyard?—After a few months at Woolwich dockyard I went afloat as an engineer apprentice.

6649. At what age did you complete your time as an apprentice?—At about 20 years of age.

6650. And then what did you become?—A third engineer.

6651. If you were to retire now, what time would you count?—I could count 25 years; I should lose four years.

6652. Of your third engineer's time?—Yes.

6653. Have you completed your 11 years as chief engineer, to give you all your junior time?—Yes; all the time that is allowed to count.

6654. Would you wish to be promoted to the rank of inspector of machinery now?—No.

6655. Why not?—In the first place there would be no prospect of employment for the next two or three years, and in the second place, the pay of a chief engineer may be 25s. a-day, inclusive of charge money; the pay of an inspector of machinery would be no more, and yet he would be responsible for the whole fleet.

6656. If you were promoted to the rank of an inspector of machinery, what pay should you go on immediately?—25s. a-day only.

6657. And half-pay?—16s. a-day.

6658. Were you offered your promotion?—I was; it was given to me, but I declined it, and it was cancelled.

6659. Have you considered the present state of promotion of engineers to the rank of chief engineers,

and do you think that it is satisfactory?—No, anything but that.

6660. Have you thought of any scheme for improving it?—I have concocted a scheme, but I do not know whether I can put it before you.

6661. We should like to have your own ideas?—These are my own ideas. I think that an assistant engineer ought to be promoted to the rank of engineer after three years' service, and his pay to be progressive. I think also that no officer in future ought to be appointed engineer for special charge; this was abolished in 1870, but it is revived again by the circular of the 5th May, 1873, and can be seen in the last official Navy List.

(*It was explained to the witness by Mr. Wright that he was mistaken in that respect.*)

It is my opinion that no engineer over 40 years of age should be promoted to the rank of chief engineer, as he has then been too long in a subordinate position to fit him for the post; that an engineer after 14 or 15 years' service ought to be promoted to the rank of chief engineer, but I do not see any way of promoting the present engineers unless you do away with or retire about one-half the present staff of engineers, and substitute for them engine-room artificers. I am sure that there would be economy in entering engine-room artificers. One source of economy would be this: I have found it in my own experience, taking the "Crocodile" for instance, where I had three engine-room artificers, the work was completed by them in about two-thirds of the time that it otherwise would have been, and it was also better done; and if not done well, I could always send for the same persons and make them do it efficiently. I remember once that the repairs of the boilers had been estimated for at a certain sum, but I managed to get the work done by the engine-room artificers of the ship in about two-thirds of the time that was given in, and the ship left for her usual service; the work was well done, and I had no complaint whatever to make. I found out that the sum estimated for was £400, and I considered that it was £400 saved to the government.

6662. In that one repair?—Yes, to the boilers, joints and everything attached; therefore I think that there would be economy in entering engine-room artificers and reducing the staff of engineers. I have no doubt also that such an arrangement would make

the engineer officers much more contented than they are at present.

6663. What staff of engineers had you in the "Crocodile"?—Eight, exclusive of myself, the chief. 6664. And how many engine-room artificers?—Three.

6665. What staff would you recommend?—I would recommend for that ship, being a troopship, four engineers and seven engine-room artificers.

6666. You would keep the same total complement?—Yes.

6667. Was that estimate of which you spoke framed by the dockyard or by the steam reserve?—By the dockyard.

6668. Was the work performed by the engine-room artificers of the ship alone?—Yes, by the engine-room artificers of the ship alone, that is, the repairs to the boilers under the superintendence of an engineer.

6669. During the summer months when the ship was laid up?—Yes, during the summer months. I have brought that case forward to prove that there would be economy in entering engine-room artificers.

6670. You have said that you would reduce the number of engineers on the list?—Yes.

6671. How would you do that?—By some temporary measure at present. I would not do it all at once; I would take about two or three years to do it; I would enter engine-room artificers first, and then gradually reduce the number of engineers.

6672. Would you increase the list of chief engineers?—Yes, as that would give a greater flow of promotion to those engineers remaining in the service.

6673. How would you employ the increased number of chief engineers?—I would put them into ships whose indicated power is more than it formerly was.

6674. Could you state about what would be the limit?—About 700 indicated horse-power.

6675. (*Captain Dowell.*) What is that nominal?—About 120; we work to seven or eight times the nominal horse-power now. I have in view the twin-screw ships.

6676. (*The Chairman.*) Do you think that every ship commanded by a commander should have a chief engineer?—I do; in those ships I would have a chief engineer, one engineer, and two engine-room artificers; those engine-room artificers should be a boiler-maker and a fitter.

6677. Do you think it desirable that the engine-room artificers selected for those small ships should have been at sea before?—Certainly; I would not have any engine-room artificer on the platform of any engine-room until he had been to sea for three or four years, and had some experience, and he should never take charge of an engine-room with engines beyond a certain horse-power.

6678. Except on an emergency?—Yes of course in cases of great emergency.

6679. Do you find that the junior engineers when they first join the service are capable of keeping watch in the engine-room?—No, it was my practice to put them in the stokehold.

6680. If the number of engineers in each ship were reduced, how would you train the young engineers to render them capable of keeping a watch in the engine-room?—After they had served their time, I would send them on trials of all ships, gun-boats, and tugs, as well as to all experiments in the dockyard; they would pick up a great deal of knowledge in that way.

6681. Still do not you think it of importance that a young engineer before being put on the engine-room platform to work the engine in a large ship, should have worked engines himself; on trials he does not work the engines?—If he be made to give his special attention to the engine-room and stokehold, to see how things are going on, and what happens, instead of working telegraphs, taking temperatures, smoke numbers, carrying messages, &c.,

he will obtain a great deal of information, which would be supplemented by the instruction given him by his chief or senior engineer.

6682. Have you anything further to say about the mode of improving the flow of promotion or the position of the engineers at large?—Yes; in the first place, the evidence of respectability of the engineer students should be considered.

6683. On first entry?—Yes, I do not think it is at all conducive to the interests of the service, if it be made possible for an engineer on the platform to give orders to his father in the stokehold.

6684. Under the present regulations can that be the case?—Yes; both probable and possible. The students ought to be nominated by the Board of Admiralty; but if not so nominated, then I think that such safe guards should be erected as would ensure our getting respectable people. I mean people of a higher social position.

6685. Will you specify the safeguards?—I would give no pay for the first three or four years to the candidates. I would have them examined in London; and I would also introduce a classical examination, and the translation of English into French. Those would all become barriers, and would shut out what is now going on in Portsmouth, namely, cramming; you will see by this circular (*showing the same to the Chairman*) that a candidate is now able to pass and to gain the highest honours on certain subjects.

6686. Do you mean by this that the students are principally educated at one or two training schools?—Yes; where they are enabled somehow or the other to obtain such information of the examination, which would not be the case if the examination were removed to London or some other place. I also would suggest that the preliminary test should include the first six subjects instead of three, as at the present time; that would form another barrier. I also think that when they have entered the service as successful candidates they ought to have some little privileges accorded them, and to be treated in a different manner from what they are at present.

6687. In the dockyard?—Yes, I do not wonder at their present treatment, because I think that in many cases their tone and breeding cause it. I do not suppose they have that education and breeding which no doubt they would have received had they been drawn from a better class. They ought to have an appropriate time and place for changing their dress before leaving the dockyard. Their marrying before the expiration of their time is a very great evil.

6688. We cannot stop that?—No, that would be interfering with the liberty of the subject; yet it is one of the conditions in the indentures of an apprentice, and could be introduced with all future students. In the naval ports there are all sorts of designers; they know that the pay those young fellows receive is better than the pay which the young men in their own social class in life receive, or can attain, and therefore they strive to catch them. It is necessary that the students should be examined in the steam reserves in respect to their practical abilities.

6689. When do you mean?—At the end of their six years.

6690. That is the case?—I do not think that it is always the case; it is only at Portsmouth. I do not think it is the case at the other dockyards.

6691. It is general?—I was not aware of that. At the present time in training these engineer students, they have only one instructor, that one instructor is not sufficient. I fancy that a mistake has been made in taking the instructor from the same dockyard as the student. What I mean by that is this, it is like promoting a man in a ship to the rank of a chief petty officer, and keeping him in the same ship; he does not get the same respect paid to him that would otherwise be the case; instead of one instructor, I would

O. N. Brooker,
Esq., B.N.

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recommend one for each branch of trade. Also that a certain number of marks ought to be given for their practical ability. The examination ought to be as now directed for the engineers students, but Latin and one continental language should be included. If successful in the competition, they should have a term at the royal naval college as engineer cadets. The first ten in the civil examination to receive 6*s.* a-day and the remainder 5*s.* a-day during their year at Greenwich. To be appointed by commission as assistant engineers, taking seniority from the marks gained in the royal naval college. We are now supposing that a better class of students will enter the service, and therefore I propose that they should go into the gun-room. By the time that your scheme is promulgated, and fully developed, you will not have such a large number of engineers, and the engineers' mess will be gradually abolished, and I do not then fear that the gun and ward-rooms would be swamped by the engineers. I see that I have put down certain penalties in my memoranda, but I very much regret to find that such penalties are necessary, in order to prevent the engineers from leaving the service, conclusively showing that the inducements to remain must be very small indeed.

6692. That is a bond?—Yes; I have increased the bond I see.

6693. You recommend that four or five instructors should be appointed in each factory to instruct the engineer students. Do you think that the same benefit would be gained if each engineer student were put under the charge of an intelligent workman in the factory, although not specially as an instructor, bearing in mind the great expense it would involve to have four or five instructors doing nothing but look after the engineer students?—Would not there be the same expense in putting each engineer student under a workman; would he not be paid something for it? If you have 70 engineer students in the dockyard it would take 70 workmen to look after them, and I dare say their wages for looking after the engineer students, and time taken from their own labour, would amount, probably, to more than that which you would have to pay four or five instructors.

6694. You would look upon it as a question of cost?—Yes; only as a question of cost. A nurse for each student, to be paid by results, would be the better method.

6695. As regards awarding marks for proficiency in practical work on leaving, do not you think that the same result would be obtained if they were reported upon in five classes, such as "very good," "good," "fair," "indifferent," or "bad." Do not you think that there is a great difficulty in awarding more accurate marks than those for practical work?—I do think that there is a difficulty, but it could be surmounted.

6696. That would give them the value of their work. I presume your object is to have their practical ability recognised in their final service?—Yes.

6697. You spoke of those "successful in the competition." Those successful should go to Greenwich. To what competition did you refer, the competition on entry, or at the end of their six years?—I mean the examination at the end of their six years.

6698. And that, if successful, they should be called "engineer cadets." Do you think that the name of cadet is a step higher than that of student?—Yes, and carries with it more respect in the navy. I now come to the question of charge-money, which I think is not sufficient for the indicated horse-power that is now developed, and I have to propose that those in charge of the machinery of ships in commission should receive 1*s.* a-day for engines of and under 1000 indicated horse-power.

6699. What is the rule at present?—The rule at

present is that they get only 3*s.* a-day, no matter what the horse-power is, above 700 horses nominal.

6700. (Mr. Wright.) The rule at present is that they get 1*s.* a-day for every thousand indicated?—They do not go beyond 700 horses nominal.

6701. (Mr. Wright.) That has been altered. Then I am very glad to hear it. I was not aware of that. I think that the senior engineer of a large ship ought to receive 1*s.* a-day in addition to his pay.

6702. Up to what do you propose the charge-money should go?—1*s.* a-day for every thousand horse-power indicated, and 1*d.* in addition for each hundred between the thousands. Engines of 3,900 indicated would give 3*s.* 9*d.* per day charge money.

6703. For the "Alexandra" you would go up to 8*s.* a-day charge-money?—Yes; and it is not a farthing too much for the great responsibility.

6704. Is there any other class in the service which gets anything like that?—No; but then the engineer has to look after the whole ship. I think that a chief engineer's pay ought to commence at 14*s.* a-day, and rise to 24*s.* a-day. Instead of chief engineers having to serve, as now, five years for the 16*s.* a-day half-pay, they should serve three years, making a total of 23 years, all time counting.

6705. (The Chairman.) Then the charge-money would make up for it?—Yes; I find that the money I have put down here for this charge-money would not increase the estimates more than £1,100 or £1,200.

6706. (Captain Commerell.) Have you worked that out?—Yes. I think what I propose would give great satisfaction. Take for instance the chief engineer of an ironclad in harbour; his pay may be 22*s.* a-day, and his provision-money 1*s.* 6*d.* more; he has not two messes to keep, nor does he require much uniform, and compare him with the chief engineer of a ship in commission, who has his 22*s.* a-day, and 3*s.* a-day charge-money; so you will observe that the chief engineer in harbour is about £80 a-year better off, to say nothing of other considerations.

6707. As far as expenses are concerned?—Yes; and therefore I think that increasing the charge-money would be a great inducement for good engineers to apply for these large ships. I also am strongly of opinion that all time should be counted.

6708. (The Chairman.) What for?—Towards retirement and full pay.

6709. And half pay?—Yes, and half-pay.

6710. (Captain Commerell.) Engineers have so little time on half-pay that it hardly signifies, I think?—There is little it is true; but for instance, I have to serve five years before I get a rise of 2*s.* With regard to inspectors, I think that they ought to be under 50 years of age when promoted, to have obtained a first class educational certificate, and to be appointed to all fleets and stations. I think there is a great objection in appointing for inspector a chief engineer, instead of having an inspector of machinery present to do his duty.

6711. (Captain Commerell.) What are you to do in places like the coast of Australia, where you have no accommodation, where they have only corvettes as flag ships, and there is no accommodation for an inspector of machinery?—I allude to admirals' commands, such as the West India, China, and Pacific stations.

6712. (Captain Dowell.) With regard to the coast of Australia and such places, the ships do not move in squadrons, and it would be a very advisable thing that there should be an inspector at head-quarters at the dockyard?—Yes.

6713. (Captain Commerell.) The officer in charge of a factory should be an inspector of machinery?—Yes. With regard to their pay, I propose it to be 32*s.* a-day when in charge of a fleet, and 35*s.* a-day after five years' service; half-pay, 20*s.*, under five years' service, and 23*s.* a-day after five years' service.

6714. (The Chairman.) Service as inspector?—

Yes; chief inspector's pay when in charge of steam reserve 35s. a-day, and 38s. a-day after five years' service; half-pay 23s. a-day, and 26s. a-day after five years' service, retired pay of course in the same proportion. I think that, should you propose to reduce the complement of engineers, there should be a properly-qualified engine-room storekeeper appointed (because we shall have no engineer to put into the office), whose pay should be from 2s. 6d. to 5s. a-day. It would be cheaper to have a mechanical writer.

6715. (*Mr. Wright.*) Could not one of the engine-room artificers do the duty?—I think they would all be wanted.

6716. But I mean that one could be specially appointed?—Yes, that would do; at the present time, the chief engineer has often to depend upon an uneducated storeroom keeper, and his time is taken up in looking over the details of the engine-room register and his stores, which would be more profitably employed in looking after the ship and its machinery.

6717. (*The Chairman.*) Have you any suggestions to offer to the Committee relative to the engine-room artificers?—Yes, I have, and I would suggest that on their first entry, that they should be examined in their practical qualifications at the steam reserves.

6718. You mean in order to ascertain that they are fully acquainted with their own trade?—Yes.

6719. In addition to the examination which is laid down by the regulation of April, 1868?—That circular requires modifying.

6720. You think that they ought to be examined in matters connected with their own trade?—Yes.

6721. Have you known any case of an inefficient artificer being entered in the service?—Yes.

6722. Will you state it?—I have known of the following instance:—A man of a certain trade, a blacksmith, is sent on board, and I tell him to do a piece of work, and he fails to do that work. I wish to know what was his trial job, and he tells me a spanner; I ask him to make another, and his workmanship shows that he is not a smith.

6723. How do you think that a case of that sort could be prevented?—By having the candidates examined in the steam reserve.

6724. In matters connected with their own trade?—Yes; and with regard to their pay it should be progressive; at present it is 5s. and 5s. 9d. a-day after three years' service, and it stops at that; there is no further rise. It should commence at 5s. 6d. a-day, and 6d. a-day increase for every five years' service. For after a man has been in the service for so many years, he becomes entitled to a little more pay.

6725. Would you continue that progression after the end of his 20 years' service?—Yes, because up to 10 years he will probably leave you unless you do raise his pay and induce him to stop. He ought to have a better pension to look forward to.

6726. What pension would you suggest?—I would go as far as £70 a-year; at the present time I think they get £50.

6727. On what would you recommend that his right to pension should depend?—On his services. I would give them £70 a-year after 20 years' service.

6728. Should they all be equal?—I was going to propose giving another rating to artificers.

6729. Do you mean to have two classes of engine-room artificers?—Yes. I think also that they should have a separate mess berth, and a servant to wait upon them, and their chests should be larger than the present regulation size. There was a little disturbance the other day when the size of the chests was reduced. I should also prefer artificers from the outside.

6730. From the private trade?—Yes, and when advertising for artificers they should be informed that Sundays are included in the pay. Some came

to the "Volcano" who did not find out for a time that Sundays were included; they thought that 5s. meant 30s., and not 35s. a-week. The circular respecting their qualifications ought to be altered.

6731. In what way?—If you carry out that circular strictly, you will, I think, get very few artificers to enter, for instance, "how to act in any of the ordinary casualties occurring in the engine-room." That opens a very wide field; we have engine-room artificers coming as candidates who, when they look at this examination, do not feel disposed to try it. Take, for instance, an engine-room artificer in an ironclad, how can it be expected that he could take charge of a pair of engines, which are perhaps very complicated engines, after 12 months' service: yet he cannot get his confirmation until he obtains that certificate from the captain. I think that might be taken out.

6732. How would you have it modified?—I would take it out entirely, or alter it to "stokehold watch."

6733. That he is capable of keeping a stokehold watch?—Yes. With regard to the pension of of engine-room artificers, we are safe in saying £70 a-year; they would not like to lose that, and we should get such a grasp upon them that we should be able to retain them to the end of their time. As an inducement for engine-room artificers, I would recommend that we should have a certain number selected, for their superior mechanical skill, for the higher grades of leading pattern-maker, fitter, boiler-maker, smith, coppersmith, and moulder, six trades, and that they should be appointed to flagships and to steam reserves. The day may come when we shall want a floating factory to each fleet.

6734. What pay would you give those men?—1s. 6d. a-day more, and a pension of £10 a-year more.

6735. What trades would you recommend for engine-room artificers?—Pattern-makers, boiler-makers, fitters, engine smiths, moulders, and copper-smiths.

6736. Do you think that a pattern-maker and a moulder would be wanted afloat?—They should be attached to either a flag ship or a floating factory.

6737. What number of engine-room artificers have you at work in the floating factory now?—We have now, including those in the workshops, only about 16.

6738. Have you control of the workshop on shore as well as of the floating factory?—There is a chief engineer appointed to the steam reserve workshop.

6739. Not under you in any way?—I have got charge of all the stores, and make out all the estimates; they all come under the floating factory.

6740. Have you got ample work for the 16 men?—Yes, full work.

6741. Looking to the size of the factory on shore, and of your floating factory, could you form any idea of the number of engine-room artificers which you could with advantage employ, and keep employed during the year?—I think that we could employ all the engine-room artificers that now come in from foreign service.

6742. What number is that?—It ranges from about 10 to 30, or has done so since I have been there.

6743. To be with you at one time?—Yes.

6744. I mean, looking to the extent of the shops, and the tools, and machinery which you have, what number of men could you employ there, supposing that work was found for you?—I could keep employed 20 engine-room artificers in the "Volcano" alone, and 20 more in the workshop.

6745. And you have 16 now?—Yes.

6746. Then you could only employ 24 more?—But there are other parts of the steam reserve as well to look after.

6747. Where do you mean?—They could be employed in the different ships, in the reserve, at Haslar, in the gunboats, steam launches, &c.

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6748. What number?—I could employ another 20.

6749. That would be 60?—Yes.

6750. Do you think that it would be a great inducement for artificers to join, and to become reconciled to the service, if they felt that after a few years afloat, they were sure of employment in the steam reserve?—Yes; I do not mean in the dockyard, but in the steam reserve.

6751. Supposing that it was considered desirable to form a reserve of engine-room artificers, in order to supplement our engineers in time of war, do you think that you could employ more than 30 with advantage?—Yes, I could; we could always find work, or draw in work for them.

6752. Have you not the power in the steam reserve of taking any work in the repair of ships that you wish to take?—We have, as all defects pass through the steam reserve.

6753. Before a ship shall have been put into the dockyard, you can select any amount of repairs that you are capable of doing?—Yes.

6754. And whatever work you do in the steam reserve, goes so far to relieve the factory?—It does. In addition to my previous remarks, I wish to say that the stoker mechanics ought to receive more mechanical money than they are receiving at present; it is now only 3*d*. I find that I come across a great many men who are certainly worth something more than 3*d*. I think that you might advance their mechanical pay to 6*d*.

6755. To what would you bring it up altogether?—To about 3*s* 4*d*. a-day. I would only give that under the sanction of the steam reserve, where, from the work they have in hand, they are able to see if a man is worth the money or not.

6756. You stated just now that you would do away with the regulation that an engine-room artificer shall obtain a certificate from his captain, stating that he is fit to keep a watch in the engine-room?—Yes.

6757. Then how would you ascertain that an engine-room artificer who is compelled to keep watch in the engine-room of a small vessel, is capable of doing so?—I would let him pass an examination in about five or six years' time.

6758. That is a very long time; would you wait for six years before you considered that an engine-room artificer should be examined in that respect?—I would appoint him to gunboats in the meantime.

6759. That is in charge of engines, and he must have some sort of examination before?—I would not appoint them for that duty until they had been five or six years in the service.

6760. Have you had any experience of the engine-room artificers of the present day being in charge of the engine-room of small vessels. I do not mean actually on board with them, but do you know of any who have performed that duty?—I do, and they did it satisfactorily, but I think they had been engine-room artificers of six years standing. I would wish to modify what I said; I would make the examination at the end of four years. I may ask if it would not be well to call an artificer a "machinist," the same as in the American service, in order to distinguish them from some of the other artificers.

6761. (*Captain Dowell*.) I understood you to say that you would not enter blacksmiths at all as engine-room artificers?—Only a limited number.

6762. You mean engine smiths, not blacksmiths?—Yes, engine smiths.

6763. Have you any suggestions to make about the uniform of the engine-room artificers?—They complain of their short jacket, and say that they want a frock coat.

6764. Do you think that you would recommend any alteration?—I think that they might have a frock-coat or a cutaway coat; I prefer the cutaway to the other.

6765. You also said that you could come down upon the engine-room artificers, when you could not come down upon the engineers for not doing their work well?—I do not think I said that; I believe I said that in the case of engine-room artificers doing certain work, and in the event of that work not being done well, I could always send for those who had not completed it satisfactorily, whereas in the case of the work being performed in the dockyard, such could not be the case, because I should be away from the dockyard.

6766. (*Captain Commerell*.) Have you heard from those men who have passed through your hands in the factory, what the principal complaint of the engine-room artificers with the service has been?—That their pay is not progressive, and they consider they are interfered with too much by the master-at-arms.

6767. Do you think from what you have heard that the complaint is a valid one, or do you think that through their being brought into the service at first as men, they are impatient of control?—From my experience I think that they are in a very great measure correct. I have had to fight the question myself, and through having a great deal of influence with the captain, I was able to make the engine-room artificers in the "Crocodile" comfortable. In the "Sultan," the mess place which they have is a very great improvement; there they are kept away from the lower deck, and are not under the influence of the master-at-arms. It is in the power of the master-at-arms to be very severe with the engine-room artificers, and to make it uncomfortable for them. If you put them in a separate mess, and allowed them to be under the charge of the senior engineer, you would do away with a great deal of this complaint.

6768. Then you would propose that they should mess by themselves and not with the chief petty officers?—Yes, by themselves, and I would certainly give them a man to attend upon them.

6769. Give them somebody to clean their mess and to cook for them?—Yes; at the present time they have to depend upon the chief engineer for a stoker, and a chief engineer often sends the worst stoker that he has for that purpose.

6770. (*Captain Commerell*.) Do you think it would meet their wishes, if they had two stokers to mess with them for the purpose of cleaning out their mess, and who were responsible for the cleanliness of it?—Yes; but then the chief engineer loses two men from his complement. I say give them a man to attend upon them. An engine-room artificer has not been accustomed to clean a mess, scrub hammocks, and that sort of thing, the same as a chief petty officer.

6771. (*Captain Dowell*.) I would not give them a servant; you must remember that the chief petty officers are the best men of their class in the world. They are men who have served their country well and faithfully for 14 years you must remember, and they have risen to the highest position which they can achieve. Surely, although the service which they render is not worth absolutely so much money as the service rendered by an engine-room artificer, they ought to be treated with quite as much respect as those men; an engine-room artificer starts on his career with all the privileges which those men have gained only after a long and faithful service?—Quite so; but it could be managed in some way to give them someone to clean their mess for them; and it must not be forgotten that the artificer would be more remuneratively employed in the engine-room than in those domestic offices, which could be cheaper done by a man more suited to them.

6772. (*The Chairman*.) Do you think if it were desirable to raise the social status of the engineers, it would be possible or beneficial to have them mess and reside in the dockyard?—Certainly; I was thinking whether they might not have a ship along-

side if they could not have a college for them to mess in.

6773. Do you think that a mess for the engineers on harbour service, that is to say, in the steam reserve, would be beneficial for them?—Yes, certainly, that is, for those who are single, or whose residences are far from the dockyard.

6774. For the engineers in the steam reserve as well as for the engineer students; have you considered whether it would be desirable for them to mess in the dockyard; have you heard it mooted by them?—No; I never have, but I think it would be desirable for the engineer students. I think that engineers on coming home from foreign service, and more especially if married men, prefer to go to their homes.

6775. Are you a married man?—Yes.

6776. Have you any mess for the engineers in the "Volcano"?—Yes.

6777. Where?—In what formerly was the gun-room.

6778. Where you can dine if you like?—We have no cook, they take their luncheons on board, the same as I do. If you will permit me, I should like to bring before the Committee the following suggestions, which I have carefully drawn up after some consideration. I may say that these are entirely my own ideas. I have already referred to most of them in my evidence.

SUGGESTIONS FOR THE SUPPLY OF ENGINEERS AND ARTIFICERS.

ENGINE-ROOM ARTIFICERS.

To be examined in their practical qualifications as workmen at a dockyard or steam reserve.

To read and write sufficiently well to enter the particulars in the rough engine-room register.

The present circular to be modified in respect to the theoretical examination, and the certificate required from his captain.

To be acting for one year.

To receive 5s. 6d. a-day.

In advertising for artificers at the different sea-ports, counties (Yorkshire, Lancashire, &c.), to add the remark "5s. 6d. per day, Sundays included."

After one year, if found fit for the service, to be confirmed.

Scale of Pay :—

	s.	d.
On entry	5	6
After 1 year and confirmed..	6	0
*After 5 years' confirmed service ..	6	6
After 10 years' confirmed service ..	7	0
After 15 years' confirmed service ..	7	6
After 20 years' confirmed service ..	8	0

To receive a pension according to service, commencing from £60 per annum.

A certain number (about 50) for their superior mechanical skill, good conduct, service, and trustworthiness, to be selected for the higher grades of leading patternmaker, fitter, boilermaker, smith, coppersmith and moulder.

To be attached to steam reserves and flagships of each fleet or station.

Pay 1s. 6d. above that of engine-room artificers. Pension £10 a-year above engine-room artificers.

Five fleets or stations, and three steam reserves.

To have a separate mess, or mess-room, and a servant to cook, &c.

Cleanliness, &c., &c., under the supervision of the senior engineer.

To be placed first on the list of chief petty officers. Chests to be larger than the present regulation size.

ENGINEER STUDENT CANDIDATES.

The entry, education, examination, pay, &c., to be

* After four years, to pass the examination as directed in the present regulations (art. 109, page 40, addenda) to qualify for the increased pay, and employment in ships where the engineer staff was small,

as laid down in Circular No. 8 C., 30th January, 1873, and 34 D., 5th May, 1873, with the following modifications and additions.

1st. Evidence of respectability to be unquestionable.

2nd. Information to be made more generally known to the eminent engineering firms, and throughout the country.

3rd. Age between 14½ and 16 years.

4th. To be nominated by the admiralty.

5th. Examined by the civil service commissioners in London only.

6th. Subjects of examination to include Latin and translation of English into French.

7th. Preliminary test to include the first 6 subjects, viz :—Arithmetic, orthography, handwriting, grammar, English composition and geography.

8th. Successful candidates to wear uniform, and have an appropriate time and place for changing their dress before leaving the dockyard.

9th. To receive no pay until the third year, and then at the rate of 2s. 6d. per week.

Fourth year	5s. per week.
Fifth "	8s. "
Sixth "	12s. "

Marrying before the expiration of their time, to be disqualified for the navy.

To be examined at one of the steam reserves in respect to their practical abilities at the end of the sixth year; if unfit, to be allowed a longer term of not more than 12 months.

To receive a certain number of marks for practical abilities.

ENGINEER CANDIDATES.

Candidates from dockyards or private firms to be examined by the civil service commissioners in London.

Examination to be that as now directed for engineer students of 6 years :—Latin and one foreign language inclusive; if successful in the competition, to have a turn at the royal naval college as engineer cadets. The first 10 in their civil service examination to receive 6s. per day, and the remainder, 5s. during their term at the college.

To be appointed [by commission as assistant engineers, taking seniority from the marks gained in the royal naval college. To mess in the gun-room. No assistant who has passed one term at Greenwich to be permitted to leave Her Majesty's service within three years of the completion of his term at Greenwich, unless he shall pay the sum of £100 to defray the charges of his education.

For one who passed two terms not to leave within five years, and paying a sum of 200. For one who has passed three terms not to leave within seven years, and paying a sum of £300.

ENGINEERS AND ASSISTANT ENGINEERS.

Assistant engineers to be promoted to engineers after three years' service. Pay of engineers and assistant engineers to be progressive according to the following scale :—

Rank.	Time.	Pay per day.
Assistant engineer	..	8s.
Engineer ..	under 3 years	9s.
" ..	over 3 " ..	10s.
" ..	" 6 " ..	11s.
" ..	" 9 " ..	12s.
" ..	" 12 " ..	13s.
" ..	" 15 " ..	14s.

Half-pay in the same proportion.

No officer in future to be appointed engineer for special charge, as proposed in Mr. Childers' scheme of 22nd February, 1870, but which appears to be revived in the circular of 5th May, 1873, and can be seen in the last official navy list.

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16 Nov., 1875. No engineer over 40 years of age to be promoted to chief. Exceptions to be made in favour of those possessing the present 1st or 2nd class educational certificate.

CHARGE MONEY.

Engineer officers of all ranks when in charge of the machinery of ships in commission to receive 1s. per day for engines of and under a 1000 indicated horse-power.

In all other ships in commission to receive 1s. for every thousand, and 1d. in addition for each hundred between the thousand.

One half of this allowance for ships in 1st class steam reserve.

The former "charge-money" allowances, as directed by art. 252, addenda, to be in force where this change of indicated power for nominal would lessen the allowance.

Example, I.H.P. of 5650, allowance	5s. 6d.
" " 8000, "	8s. 0d.
" " 2900, "	2s. 9d.

The senior engineer of large ships to receive 1s. per day in addition to his pay.

CHIEF ENGINEERS.

To have charge of all machinery, &c., &c., from the mast to the keelson. Pay to be increased by commencing from 14s. and the above scale of "charge-money"; half-pay to be 16s. after 23 years' service. After 11 years' service as chief engineer, to reckon as junior service for full and half-pay, and "retirement," all time served from date of entry into the navy.

INSPECTORS.

To be under 50 years of age when promoted.
To have obtained a 1st class educational certificate.
To be appointed to all fleets and stations.
Pay 32s. per day when in charge of a fleet.
" 35s. " " after 5 years' service as inspector.
Half-pay, 20s. under 5 years' service.
" 23s. after 5 " "
Retired pay in the same proportion.

CHIEF INSPECTORS.

While in charge of a steam reserve.
Pay 35s. per day, 38s. after 5 years' service as chief inspector.
Half-pay 23s. " 26s. " "
Retired pay in the same proportion.

COMPLEMENTS OF SHIPS.

Chief engineer 1, engineers and assistant do. one half of the present complement.

Artificers to fill reduced staff of officers.

Example.—"Devastation," present complement, 9 engineers and 4 artificers; future complement, 5 engineers and 8 artificers. Such artificers to be 5 fitters, 2 boilermakers, 1 smith.

Example.—"Magpie" 3 (twin-screw), present complement, 3 engineers and 1 artificer; future complement, 2 engineers and 2 artificers, 1 fitter, and 1 boilermaker.

A properly qualified engine-room storekeeper; rank, petty officer.

Pay 2s. 6d. under 5 years.
" 3s. 0d. over 5 "
" 3s. 6d. " 10 "
" 4s. 0d. " 15 "
" 5s. 0d. " 20 "

Or a writer for the engine-room office, with present unqualified storekeeper.

Number of engineers and assistant do. at present on the list	740
Required to be admiralty appointed as calculated from the above complements	380
Required for the 3 steam reserves	75
	<hr/> 455
To be retired	285

RETIREMENT OF ENGINEERS.

A Temporary Measure.

Engineers who have not passed a term at Kensington, Greenwich, or who have not obtained a 1st or educational 2nd class certificate, to be permitted to retire at the rate of £8 for each year's service in all ranks. Those of 10 years' service as engineers to have a step in rank on retirement.

RETIREMENT OF CHIEF ENGINEERS.

A Temporary Measure.

Those who have 18 years' service on full pay as chief engineers to be permitted to retire upon the maximum.

A deduction of £10 per year for every full year short of 18.

A step in rank on retirement.

Chief engineers of 15 years' seniority as chief to be inspectors, if desired.

Chief engineers of 8 years as chief to rank with those over 15 years for the allowances to widow, children, &c.

Chief engineers under 8 years as chief, over 8 years for the allowances to widow, children, &c.

Chief engineers to retire as herein proposed or by counting all time prior and subsequent to 1847.

RETIREMENT OF CHIEF INSPECTORS AND INSPECTORS OF MACHINERY.

A Temporary Measure.

To have the option of retiring at 50, £15 extra per annum for each year's service in those ranks, provided that such increase will not bring their retired pay above £550 and £500.

The proposed entry, examination, &c., of engineer students to be commenced as soon as possible.

Retirement of engineers to be uniform with the supply of artificers.

By calculating roughly the difference in wages by retiring 285 engineers, and entering the same number of artificers, taking into account the increased pay and charge money to chief engineers and the remaining engineers, and by abolishing the engineers' mess, there would be a saving of about £1800 a-year, and this amount is exclusive of the less pay to engineer students, and extending the entries of engineer candidates to those outside the dockyards; also of the difference between the half and retired pay of engineers and pensions of artificers.

PRESENT PAY OF ENGINEERS.

	£	£
461 Engineers at 10s. per day	84,132	
120 " 9s. "	19,710	
53 " 7s. 6d. "	7,254	
103 " 6s. "	11,278	
	<hr/>	122,374

PROPOSED PAY.

150	Chief engineers at 2s. per day increase	5,475
	Increase of charge-money ..	1,186
154	Engineers at 12s. over 12 years	33,726
108	" 11s. " 9 "	21,681
80	" 10s. " 6 "	14,600
70	" 9s. " 3 "	11,497
43	" 8s. under 3 "	6,278
285	Artificers at 6s. average	31,207
		<hr/> 125,644
		Increase <hr/> 3,270

By abolishing the engineers' mess and allowing one servant in the artificers' mess, there is a saving in wages alone, irrespective of mess utensils, &c.	£	5,100
Saving per year		<hr/> 1,830

PENSIONS.

285 Engineers at £6 per year, average 17 years.	£	29,070
285 Engineers at £7 (suppose)		33,915
" " £8 "		38,760
For 285 artificers at £60 per year, average		17,100
So that the sum saved in pensions is about one-half, by entering artificers and retiring an equal number of engineers.		

ARTIFICERS REQUIRED FOR THE NAVY.

For the Fleets.	{ Fitters	240
	{ Blacksmiths and boilermakers	149
	{ Coppersmiths	16
		<hr/> 405
5 Reserves.	{ Fitters	24
	{ Blacksmiths and boilermakers	12
3 Reserves & 5 flagships.	{ Patternmakers	8
	{ Moulders	8
	{ Coppersmiths	8
		<hr/> 465

(The witness withdrew.)

JAMES ALBERT BEDBROOK, Esq., R.N., called and examined.

6779. (*The Chairman.*) What position are you now holding?—I am assistant to the chief engineer at Chatham dockyard.

6780. What is your standing as an engineer?—A little over six years, the 21st of August 1869.

6781. When did you first enter the service?—In April, 1864.

6782. Were you an engineer student in the dockyard?—Yes.

6783. In what dockyard?—At Portsmouth dockyard, in 1859, I entered the service as a student, and I entered the navy as a second assistant engineer in the year 1864.

6784. What were you called at the time you entered the service?—I think we were called factory boys.

6785. Did you go to South Kensington?—Yes.

6786. In what year?—From 1864 to 1867, during those three sessions, commencing in November, 1864.

6787. Were you in the dockyard as an engineer student at all?—Yes.

6788. For about a year was it?—Yes, for about a year.

6789. What diploma did you take at South Kensington?—A fellow.

6790. What class?—The third class.

6791. What number of engineer students is there now at Chatham?—I think a little over 30; 34 I think it is, but I cannot say for certain.

6792. Are you satisfied with the mode of entry of engineer students and the class from which they are drawn?—No, not as a rule.

6793. What alteration, if any, would you wish to see in the mode of entry?—I think that nominations should be given by the Admiralty, and that entry should not be open to public competition as it is at present.

6794. Have you any suggestion to offer to the Committee as to the mode of training of the engineer students while in the dockyard?—Yes, I think in the first place that they should not be treated altogether the same as the trade boys, as is the case as present, they have of course to keep the same hours as the workmen and to take up tickets, and are treated in the same way in all respects as the trade boys in the dockyard. In the second place I think it

would be beneficial to the service to treat them differently altogether, and to look more after their training; it is not in my opinion well looked after now because it is merely under the charge of a leading man.

6795. Do you refer to their practical training?—Yes, to their practical training.

6796. What would you suggest as an improvement?—I would suggest that an engineer be appointed at each dockyard in order to train the students.

6797. A naval engineer do you mean?—Yes, a naval engineer, one who would have control over the students, and he should have their theoretical training as well to look after.

6798. Do you mean their schooling?—Yes, that is my idea.

6799. Do you think that the appointment of a naval engineer to look after them would improve their practical training as workmen in the fitting shops?—No, I do not think that.

6800. Then what would you suggest with regard to that point, or have you considered whether any improvement could be made in their training as workmen?—I do not think that any improvement could be made upon what we do at Chatham; there they turn out very good hands at their work, but they are looked after very strictly; unless they are kept strictly to work, they will not turn out good workmen at all.

6801. Who examines them at the end of their six years in their practical work?—We have not yet had any at Chatham whose time has expired.

6802. How long have the engineer students been appointed at Chatham?—For a little over four years. My idea also with regard to the engineer students is that it would be very beneficial to them to be subjected to a certain amount of naval discipline during their studentship. At present of course they live at home up to the age of manhood, and they naturally acquire home tastes, so that in fact when they come into the service it is rather distasteful to them, and they do not seem to like submitting to naval discipline.

6803. Do you mean by that, that you would have them reside and mess in the dockyard under the charge of a naval engineer?—Yes, I think so, every

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J. A.
Bedbrook,
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Esq., R.N.

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other class of officer is brought up from boyhood to naval discipline.

6804. Do you consider as a rule that an engineer student learns as much of his work in the shop as the trade boys?—Yes, quite as much if he gives his mind to it.

6805. What is the fact, that is what I want to know, do you think that they do learn as much?—I am quite certain that they do at Chatham. Of course they have only a limited time at the various trades, but for the time that they are at each particular trade, they make very good progress indeed.

6806. Have you any suggestion to offer to the Committee with regard to their school training during their term of six years?—I said just now that I think one of the junior naval engineers who has taken a first place at Greenwich should have their training at school.

6807. Would not that clash with the schoolmaster?—I would take the students entirely away from the schoolmaster.

6808. Then you think that the students school-master should be a naval engineer?—Yes.

6809. Are you aware that the position of school-master at the dockyards is open by competition to naval engineers?—I see that it is now.

6810. Have the students during the time of their work at Chatham any instruction in what one may call the mechanism of the steam-engine?—None.

6811. None whatever?—No.

6812. Do you think that it is desirable they should have some instruction in that respect?—Yes; I think it would be very desirable.

6813. How do you think it could be given to them, I mean for their training to work up to the practical engineering papers that are given them by the Admiralty authorities in their examination?—We teach them as well as we are able by employing them on board ship as much as possible, and by taking them on trial trips, in order to learn the practical working of the engines.

6814. Do they work in the erecting shop?—We have no erecting shop at Chatham; they are examined of course in those matters; I do it myself every six months; they receive a little instruction on steam machinery on trial trips. I sometimes ask them questions, and try to induce them to ask questions if they do not understand any particular parts of the machinery.

6815. Have you any engine-room artificers at Chatham?—Some are entered there.

6816. Are there any employed there?—Yes; in the steam reserve floating factory.

6817. Have you ever had an examination of them at Chatham?—Yes; frequently.

6818. In what way?—Verbally.

6819. In what?—In the subjects inserted in the Navy List.

6820. Do you ever examine them in matters connected with their own trade?—They are usually sent on board the floating factory for a day or two, in order to see what they are capable of doing in their trade; that is usually done by the inspector of machinery in the steam reserve.

6821. Have you had any engine-room artificers enter from the factory at Chatham?—Very few.

6822. Have you had any?—Yes; three or four, one or two fitters and blacksmiths.

6823. Have you any suggestions to offer to the Committee with regard to the position of the engineers in the navy generally?—Yes; I do not like, first of all, the isolated mess system which they have; I think that that is very objectionable indeed; and secondly, I think that the senior engineers should mess in the ward-room, and the junior engineers in the gun-room; of course they would require increased pay on bettering their position in that respect. I think that many of the evils which are complained of at the present day by the engineers are greatly due to that isolated system of messing, and keeping them

aloof from their brother officers. It frequently happens that they have a very dark place in which to mess, and after having arduous duties to perform down below, it is not a very nice place to retire to on being relieved from those duties.

6824. As a rule, is the gun-room mess any better?—Yes; in the cases I have seen it has been so.

6825. But it is generally very crowded, is it not?—Yes; it is crowded, but if the number of officers were increased in the gun-room, then I suppose the accommodation would also have to be increased.

6826. Do you think that the theoretical education which the young engineers receive at the present day is satisfactory, or are there any points which you would wish to see altered?—The theoretical education is almost *nil* in the dockyard. Of course they get a very sound theoretical education at Greenwich when they go up, but the time is very short compared with the time which they have in the dockyard.

6827. You do not consider that the education which they receive is too high?—No, I do not.

6828. Are there many of the engineers who have passed through the higher course at South Kensington or Greenwich who are now employed as engineers at sea?—Yes, there are some employed at sea, but I cannot say the number.

6829. Is it a large number?—I should think the larger number; the largest half is at sea at the present time. I understood you to mean the whole of those who passed through South Kensington instead of those who took the highest course. A number of those who took associate diplomas are still at sea. I think nearly the whole of them.

6830. (*Captain Dowell.*) You say that if the engineers and assistant engineers were introduced into the gun-room, you think that they then ought to have more pay?—Yes.

6831. Why should they have more pay?—I think the pay of the senior engineers should be higher.

6832. But not with reference to their being removed into the gun or ward-room messes?—No.

6833. (*The Chairman.*) You said that you wished the engineers to be introduced into the gun and ward-room messes?—Yes.

6834. Bearing in mind the class from which they have lately been taken, and of which you have expressed your disapproval, do you think it is possible that men who come from the position that many of those men do come from, and who have been living with their families for the five or six years they have been in the dockyard, could be introduced at once into the gun and ward-room messes?—I have some doubts upon that point, for the reason that they are so mixed up now with the workmen, at just the age when they are most susceptible of acquiring bad habits.

6835. Many of them are married amongst their own class of life?—Yes, unfortunately they are.

6836. (*Captain Dowell.*) You say that they are mixing with the workmen, but in doing so they are not mixing with men below their own class?—Some of them are the sons of naval officers.

6837. (*Captain Commerell.*) Have you ever seen a list of the parentages of the engineer students who have entered of late years?—No.

6838. Here is one (*handing the same to witness*)?—I do not like the look of it.

6839. (*The Chairman.*) Do not you think that fact renders it very difficult to introduce those men at once into the gun and ward-room messes?—Yes.

6840. (*Captain Commerell.*) Do you think it would be advantageous that the engineer students should be differently treated to what they are at present?—Yes, very advantageous, considering the position which they will ultimately occupy.

6841. Is there anything that you can suggest with regard to any messing arrangements, during the time

that they are engineer students?—I think that some accommodation should be found for them in each dockyard while they are undergoing their course of training, where they could live entirely; it should be, I think, either on board ship or in a college, or something of that sort.

6842. Have you had any experience of engine-room artificers?—No, except in the examination of them.

6843. Have you had to examine them?—Yes, for the service.

6844. Practically?—Not practically.

6845. Are they ever examined practically?—Yes, by the steam reserve officers.

6846. We have had it in evidence that the steam reserve officers do not examine them practically until after they are entered?—I understood from Mr. Murray, that he either tries them or takes their certificates; but I would here explain that only those candidates, who were already in the service in other capacities, were tested practically, and one such case was present to my mind when answering the previous questions.

6847. Mr. Murray says in his evidence, "We cannot test them with regard to their ability until after they are entered." Have you known that they are practically tested before they are entered, or is it simply the fact of their having indentures that you take?—Simply that fact of their having indentures.

6848. The indentures are taken as sufficient evidence that they are thoroughly good workmen?—Yes, and by the characters which they have with them for the whole of the time after they have served their time.

6849. Do you consider that that is sufficient evidence to ensure our obtaining the sort of workmen that we ought to have?—Not at all times.

6850. Have you known any instances of engine-room artificers of inferior qualities as workmen, being admitted into the service?—I have heard of such being the case, but I know nothing about it myself.

6851. Is it an exception, or has it frequently occurred?—Frequently, I think. I have heard chief engineers say that the engine-room artificers were not up to the work as they expected.

6852. (*Mr. Wright.*) Can you find suitable employment for the number of engineer students that you have at present at Chatham?—Hardly; we have not sufficient engine work to keep them all employed.

6853. What would you consider a proper number at present to keep; are the 34 men that you said you had properly employed, or do you think that is

rather too many?—We shall have more engine work to do by and bye probably, and be able to employ more; we take every opportunity of employing them on any suitable work which offers itself.

6854. (*Mr. Covey.*) With regard to the engineer students messing in a college or on board a ship, as you suggested, do you think that such a course would be necessary if a better class of engineer students was entered into the service?—Yes; my idea was, that they should be subject to naval discipline for the whole time between youth and manhood; it seems to me that they acquire too great a love of home and home tastes.

6855. (*The Chairman.*) You mean that you want them looked after when they are off work?—Yes. I wish to make one remark with reference to the engineer students. I think that if a great stimulus were given to them to enter the service, there would be no need to have such things as indentures which we have at present for them; many of them at Chatham have left, and I have inquired why they left, and their only answer is, that they have a great distaste for a seafaring life; that is the reason I mentioned that if they were weaned, as it were, from their home tastes at that early age, they would then think less of entering the service, or be more inclined to do so.

6856. What number of students have left Chatham in that way?—Five or six have left.

6857. Before they had been four years in the dockyard?—I think we have had four of the senior ones who have left.

6858. (*Captain Commerell.*) Have they paid any forfeit?—No.

6859. Then they get four or five years' education for nothing, and then go?—Yes, but now they cannot; still that shows to me that there is hardly a sufficient inducement for them to remain in the service. I think it points to that fact.

6860. (*Captain Dowell.*) Do you mean to say that they can get better pay outside?—They prefer a lower position really than that of an engineer, who is a commissioned officer; they choose a lower position than that in preference to going to sea.

6861. (*The Chairman.*) Do you consider that the students earn their pay in the fitting shop?—I believe they do in most cases.

6862. During the last part of their time?—Yes; so far as my experience goes, at Chatham they do.

6863. (*Mr. Covey.*) Do you think it is a great distaste for the sea, or the want of inducement, that prevents these men from remaining in the service?—I think it is both, but there is no doubt a distaste amongst them for the naval service.

(*The witness withdrew.*)

CAPTAIN CHARLES FELLOWS, R.N., C.B., called and examined.

6864. (*The Chairman.*) You are, I believe, superintendent of Her Majesty's dockyard at Chatham?—I am.

6865. How long have you held that position?—For 1 year and 9 months.

6866. What appointment did you hold before that?—I was captain of the steam reserve at Devonport for three years.

6867. We have had it in evidence that there is a great stagnation of promotion amongst the engineers, from the position of engineer to that of chief engineer; are you aware of that fact?—I am aware of it.

6868. Do you think that promotion amongst the engineers is in a satisfactory state?—I do not think it is. I think that as far as the engineers are concerned, their expectations when they entered the service have not been realized.

6869. Are you aware that an engineer is not promoted to the rank of chief engineer now, in the ordinary course of things, until he has reached the age of 42 or 43?—I am not aware of that.

6870. Have you any suggestions to offer to the Committee that you think would improve that state of things?—Yes, I have a few suggestions that I wish to make. I would suggest that the engineers should be placed on a totally different footing to that upon which they now stand; that is, that the chief engineer of the ship, and the two senior assistants to him, should be considered executive officers; that is to say, that after the engineers have been for a certain time in the service, they should become executive officers. Men-of-war now are nothing more nor less than floating machines; there are the steam capstan, the steam steering gear; every portion of your guns, slides, and carriages

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Bedford,
Esq., R.N.

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Capt. C.
Fellows
R.N., C.B.

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Fellowes,
R.N., C.B.
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worked by steam; there are the double bottom, and the inner bottom, and everything connected with the machinery itself; in fact, the whole ship is now a floating machine, and is more or less under the direction of the chief engineer. The chief engineer is quite a different officer to what he was in years gone by, and a great deal more is expected of him. In my opinion, he should have the power of giving an order to any man in the ship, without the possibility of that man disobeying his order, or even questioning it. When I had the honour of serving as flag captain to Sir Robert Smart, in the Mediterranean, as far back as 1863 and 1864, I brought the subject under his notice, in the then hope of making the chief engineers of our ships executive officers, and reducing the number of engineers in the ships. I would now reduce the number of engineers, and I would increase the number of engine-room artificers. The engineer officers are expected to be on a footing with every other officer in the ship, if recognised at all, but they are not treated in a manner suitable to their rank; they are looked upon in a manner which I think it would be as well if we could remove them from, and let the manual labour be done in the engine-room by engine-room artificers, although the supervision shall be on the part of the engineers. What I mean is this, that the actual manual labour to be done in the engine-room should be performed by engine-room artificers. Those engine-room artificers should be either brought up in the service or taken from the labouring classes of artificers who now present themselves, but in very few numbers, because their idea is that they would wish to remain in the steam reserve and at home if possible; in order to reside with their families. Many of them, when they enter as engine-room artificers, are men of an advanced age. I feel confident myself that if those men were well paid (the highest rank that they could possibly attain should be that of chief petty officers), and they were paid according to their length of service, we should get a superior class of working engineers in the service.

6871. When you say "working engineers," you mean, I suppose, working engine-room artificers?—What I mean is that the working engineers shall be the engine-room artificers, and not the engineers themselves. With regard to those engine-room artificers they are the people who shall do the actual work of lubricating the engines, and the manual labour, of course under the direction of the engineers; but at the same time when I say "the engineers," a sub-lieutenant and midshipman should be obliged to, at certain periods, keep their watch for a week attached to the chief engineer, but so long as the chief engineer remains a civilian officer, he can never have any control over any officer of that rank. I think it would be necessary to advance the chief engineers to executive rank. In these double ships, such as the "Alexandra," of 1400 horse-power nominal, two 700 horse-power engines, the officer in charge of the machinery should be, I think, an inspector of machinery, but he should be at the same time the chief engineer, and he should have an engineer under his command for each side of his ship, each engine in fact; an engineer and three watch keepers on each side, and a junior engineer should be attached to the ship for the purpose of keeping the capstan engine, the steering engine, and all the other engines outside the engine-room in order; he should have charge of those engines, and be responsible to the inspector of machinery for their being kept in order.

6872. What complement would you propose for a ship of the "Alexandra" class?—Just what I stated, an inspector of machinery, or chief engineer as he would be, two senior engineers, and six watch keepers, and one junior engineer for the other work, that would be nine.

6873. Have you considered what number of engine-room artificers that ship ought to have?—I thought it better to leave that to yourselves, because they

must be mixed up in a certain degree with the stokers.

6874. Do you think in a ship of that class that an engine-room artificer might take charge of the stokehold?—I certainly would not allow him to do that; the "Rover" broke down through the neglect of the engineer attached to the contractors' department, and he was a man of considerable experience too, but he allowed the water to get too low in one of the boilers, and they had to pump in immediately cold water, and then one of the pipes burst.

6875. Should you think that an engine-room artificer who has had four or five years' experience at sea would be as useful in the stokehold as a young engineer who had just joined the service?—Yes, I do; when an engineer goes sick he must have somebody there.

6876. But he should be under an engineer?—Yes.

6877. What do you mean by making the engineers executive officers, are you aware that that term does not exist in the Queen's Regulations?—Yes; but what I mean is that his uniform should bear a loop; that is the clearest way of defining it.

6878. It must carry with it something?—It does carry with it position.

6879. It should carry with it position?—Yes.

6880. You mean that he should be on what is termed the military branch, instead of the civil branch?—Yes.

6881. Would the term "military branch" be the expression that would meet your views?—Yes, it would quite.

6882. Would you mean that the chief engineer should succeed to the command of the ship?—Yes, if by any possibility circumstances could throw him in that position.

6883. In what rank should he succeed?—You must give the rank in rotation according to the ideas upon the subject; he would take rank according to that. I do not mean to say that he is to rank with, or after a commander, or to take command before a sub-lieutenant, because they are all navigating officers; but when you consider what a machine a ship is now, from bow to stern, you will see that he may be in a position to command the ship even better than a sub-lieutenant.

6884. I only think of the practical way of doing it?—I would leave that to yourself and the Committee. I think if the time came for the engineer to be in command, the Admiral would not be very particular about the exact position of the man, but would be very glad to send somebody on board. With regard to taking command of the ship, you can always put in a special clause; what I mean is to give the man the position. I have seen the chief engineer of a ship which I have had the honour of commanding, bring men on the quarter-deck for refusing to obey an order; he wanted to send a man with a message to the officers, and he replied; "you had better send one of the stokers, I have nothing to do with you." I feel confident, now that we have ships without masts, and with four different screws, to go any way, sideways and forward and astern, that all those things must be done by the engineer.

6885. (Captain Commerell.) At the same time it is done by the rudder?—Yes, but he directs the rudder with his machine.

6886. (The Chairman.) You think it would be important for the executive branch of the service, if the sub-lieutenants were compelled to work in the engine-room, and to keep watch for certain periods under the engineer?—Yes, most important for sub-lieutenants and midshipmen both, as it would make them practical engineers, and if you had to send them down in the engine-room to work the engines they would then go down with confidence.

6887. And if that were sanctioned it would be a necessity that the senior engineers should have military command?—Yes, with regard to the

engineers who have to work under him. The chief engineer is of course responsible for all, and he must have an engineer of considerable experience under him for each side of the ship. There is the "Temeraire," and the "Alexandra," and the "Sultan," and the "Warrior," and all the "Audacious" class, and the "Agamemnon" will be a twin-screw vessel. In the "Alexandra" there are four separate stokeholds, and three boilers in each stokehold, and two separate engine-rooms; you can pass from one place to another through doors, but in action, when all those doors would be closed, communication would only be by engine-room telegraph.

6888. What position do the doors hold with regard to the water-line?—They are at the bottom of the ship; about 4 feet from the bottom; you first walk up a few steps, and through a door down to the other side.

6889. Is there any means of communication between the men working on the platforms of the different engine-rooms?—No, it is all closed over, and we are putting on armour-plate shutters, 3 inches of iron, over the engine; the after part of the engine-room will be open for ventilation, and will be open at all times, only gratings over; it is under the upper deck, so as to protect the engines from shot and shell.

6890. What means of communication will the engineers in the two engine-rooms have with each other?—Only by coming up the ladder; there will be a glass between in the bulkhead, so that they can see, and the indicator of one engine-room will show on both sides.

6891. Is there any engineer already appointed to the "Alexandra" in order to know all about it?—Yes, the chief engineer, Mr. Jordan, and the second engineer also. If the proposed change were made, the two senior engineers under the inspector of machinery should have cabins, and mess in the ward-room, the other engineers mess in the gun-room. I would do away with the engineers' mess and pantry, and that portion of the ship could then be devoted to giving the two senior engineers cabins; at present the senior engineer next in rank to the chief engineer, in the "Alexandria," who is holding a most important position, will not have a cabin. I am obliged to provide a cabin for the chief inspector of machinery afloat and his office, and to give cabins again for the senior engineers would be difficult, but by doing away with the engineers' mess, cabin accommodation could be found.

6892. (*Captain Commerell.*) You would have to increase the gun and ward-rooms to meet that?—That could be done. The gun-room is an immense place, and we do not provide accommodation for the number appointed to the ship, but for double the ship's complement, because there are so many supernumeraries.

6893. (*The Chairman.*) In the flagship?—Yes, and in all ships. Look at the "Rover," the midshipmen's berth is supposed to be for eight officers, and it would accommodate fourteen.

6894. Have you thought of any plan by which we could insure a supply of engineers in the event of war?—I think that there would be no difficulty in getting them from the merchant service. I see that you get these engine-room artificers from the dock-yard.

6895. Do you think that a large increase in the number of engine-room artificers would do?—Yes; I think you have quite sufficient staff to carry out the supervision; it is the actual labour which you want.

6896. At Chatham, I believe, you have not much work for the engine-room artificers in the steam reserve?—I am sorry to say there is not, as we have no erecting-shop, which is a great detriment. There should be one, I think. I heard Mr. Bedbrook speaking about the engineer students just now. I wish to call your attention to the position

before held by the engineer students, and that which is held now by a large number. They have educated themselves at the government expense for about five years, and then they demand their discharge. They have had five years' education free of expense, and it is the best education they could receive; on the completion of which many of them go away to private firms.

6897. Are you aware that at the present time they have to pay £250 to leave the service?—Yes; I raised the question. It was ridiculous their leaving in the way they did. After Mr. Eames had taken a deal of trouble with all these young fellows, and brought them well forward, in came a letter from one of them saying, "I demand my discharge."

6898. Do you think that [the payment of £250 will stop that?—Yes, I do; but many of them left after you had educated them, and to all who are now being so educated on the old scale, I think it should be put to them at once, "Are you inclined to enter into that bond, or do you intend to remain in the service?" when they would immediately say "I cannot sign that bond," and then you might say, "Then you may go." Do not educate them unless they intend to remain, for what benefit do you derive? You are educating them at the government expense, and at the end of their time they will go. I cannot say the number that have left Chatham since I have been there, but I think I am right in saying about 10; some considerable number at any rate.

6899. Do you think that the training which they receive in practical work in the fitting shop is satisfactory?—Yes; I should think it was very satisfactory indeed for them.

6900. Do you think that it is a good training?—Yes.

6901. Are they well looked after?—Most certainly they are; the rules applied to them have been strictly carried out at Chatham. The engineer students are sent up from Sheerness also, in their fifth year I think, to study shipbuilding for six months, under the chief constructor, learning the lead of all the pumps, and double bottom fittings.

6902. In fact to work in ship building?—Yes; they have two afternoons during the week for drawing, illustrating what they have learned during the week.

6903. Are the applications for entry for engineer students brought before you?—Yes, they are.

6904. Are you aware of the regulations for the entry of engineer students in the dockyards, and do you consider that you have any authority to reject an engineer student on account of his social class or position?—I should think certainly not, but I have the power of referring everything in that way to their Lordships.

6905. You have not considered that you are authorised upon your own responsibility to reject a student as a *candidate* on account of his social position?—No, not without informing their lordships.

6906. Are you aware of the parentage of the engineer students who have been lately entered throughout the service?—Not exactly.

6907. Just look at that list, and it will give you some idea; that is for 1873, 1874, and 1875, and the second column shows the parentage of them (*handing the paper to the witness.*)?—I understand that at Chatham the greater part of them are the sons of the people working in the factory.

6908. Of the artificers?—Yes, and it is also the same at Devonport, I believe. Mr. Trickett was most particular about that; he encouraged the entry as engineer students of the sons of the really good respectable people in the factory.

6909. Looking to the important position which the engineers will hereinafter be called upon to fill, and to the desirability of entering them into the gun and ward-room messes, do you think that that it is

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a satisfactory class from which to draw them?—Certainly not.

6910. Do you think it would be desirable that the Admiralty should select from the applicants, in order to raise the class of students on first entry?—Yes; I think that the students should, if possible, be obtained from a higher class. I think that if greater inducements, in the shape of pay and position, were held out to the engineers in the navy, you would get a different class of officers. The fact now is, that a man is grey-headed before he becomes a chief engineer; promotion is stopped, and a man remains 20 years in the service before he can obtain any promotion at all. There is the greatest feeling of disappointment amongst the engineers upon that point.

6911. If it is still open to public competition, without respect to the class of candidate, do you think that the standard of examination should be raised if you wish to keep out men from the classes that have hitherto come in, or how would you propose to keep them out?—In the same way you would keep out naval cadets.

6912. By nomination by the Admiralty?—Yes. I would do the same thing in the case of the engineer students, and I think you would find that you would get a very respectable class of men in. Look at the engineers in the Peninsular and Oriental Company. I know a great many of them, and they are perfect gentlemen, though many do not hold the position that these men in our service hold.

6913. (*Captain Dowell.*) Have you thought about the messing arrangements for the engine-room artificers at all?—I would make them chief petty officers after a time, but they should not rise above the rank of chief petty officer.

6914. Where should they mess?—By themselves; a large number could form a mess most comfortably; if you choose to make a little distinction by railing them in, well and good.

6915. You know their great grievance on board ship, I suppose. Almost every man we have had before us, both engineers and engine-room artificers, says their grievance is the master-at-arms, and scrubbing their mess and their hammocks?—Yes.

6916. Have you thought of any alteration that you could suggest in that respect?—When the chief petty officers were first raised to that rank, the first question they asked was, "Who is to scrub my hammock?" I know that was one of the first questions they asked. One captain put all his chief petty officers into blue jackets and brass buttons, and another would not, as it was considered to be going too near the warrant officers. It seems to me that the principal grievance of these men has been this, they do not like being turned out in the morning to wash decks, or to be mustered on the fore-castle under the engineer, during the time of divisions and inspection. I think you would find there would be no complaint, if the men were mustered on the engine-room platform, or at appointed stations. When going the round of the engine-room, you could see that each man was at his appointed station. I think that the principal grievance is being pulled up on deck, and examined like a second-class boy.

6917. Would you suggest anything about cleaning their mess?—I would put the stokers in their mess in the same way as you put two boys into the chief petty officers' mess, who clean it for them; why should not a second-class stoker keep the engine-room artificers' mess clean for them?

6918. Do not you think that it might be arranged that their leave should only rest between the chief engineer and the commander, without reference to the master-at-arms?—Yes, perfectly; I believe myself that these men would never deceive you if you treated them in that way.

6919. Have you considered their uniform at all?

—They are dressed in a blue jacket with brass buttons.

6920. They complain that the dress is unsightly?—Yes; that is because they wish to wear frock coats.

6921. Do not you think that they might have a longer coat?—No, it is quite unnecessary.

6922. Have you considered their pension at all?—I have not, but I can see no difficulty about it; I think that they are open to the same consideration as other chief petty officers. I have had so many commands, and been so constantly employed, that I am confident from what I have seen that we make a mistake in supposing that these young engineers we have are to do the work of experienced engine-room artificers. Mr. Bardin, my most able assistant at Keyham dockyard, who has now passed away, always said, "It is impossible, Sir, I do all I can to drill these young men, and to make good artificers of them, yet in nine cases out of ten they are not equal to engine-room artificers."

6923. Have you ever seen the work which they do when passing out?—They have not passed out at Chatham yet, but at Devonport I saw it all.

6924. Here is some of the work which they did at Portsmouth, do you think that is an average specimen of their skill (*showing specimen to the witness*)?—It is all very well, but the engineer student who did this work planed it not by his own hand, but with a machine; the machine did all this, he merely guided the machine.

6925. (*Mr. Wright.*) That is all hand work, with the exception of the holes, which were drilled by a machine?—There must be an immense loss of labour here then, if that be the case, the man who did this must be a *rara avis*, it is not usual.

6926. (*Captain Dowell.*) Have you any remarks to make about the pay of the engineers?—I think that their pay ought to be increased; if you want to get a good article you must pay for it; they ought to have more to look forward to when they reach the higher ranks, as a chief engineer now is responsible for so much, and is entitled, in my opinion, to a very large amount of consideration.

6927. Have you thought at all what it should be?—I have not at all. When I propose that the rank of a chief engineer of a large ship should be that of inspector of machinery, what I want is to have a large number of inspectors of machinery to be appointed to these vessels with valuable engines. Ships like the "Temeraire," when complete, will be a mass of machinery.

6928. (*Captain Commerell.*) Have you any suggestions to offer as to the pay of chief inspectors and inspectors of machinery?—No, none: I have not studied that subject at all.

6929. Are you aware that chief engineers cannot count any of their junior time until they have been for 11 years chief?—Yes; that has been one great grievance that they are not allowed to count some portion of their time, but I have not gone into that subject: I have heard of the grievance because I have had so many with me.

6930. An engineer student after passing through Greenwich, and coming on board ship for the first time, receives 6s. a-day; he then is at the age of 21; what is your opinion of that pay?—I think it is excessively good pay; you must recollect that he has been educated at the government expense entirely, and I think to begin with it is very good pay.

6931. Would you make the pay progressive?—I would.

6932. At what age should you consider that an engineer should attain the rank of chief engineer?—I have not gone into that, but I think that gallantry in action, readiness of resource, and so on, should guide it.

6933. Would you promote an engineer entirely by seniority or by selection?—To a certain degree by selection, but they should have certain qualifications

for promotion, certain service and so forth, so many years service in each rank.

6934. We have had it in evidence from all the engineers that they prefer seniority strictly, can you give us any reason why they should do so?—I should not have expected such a thing; I should have thought that they were a more enterprising class than that.

6935. (*Captain Dowell.*) Do you think that there would be any difficulty in getting the sons of gentlemen to enter as engineer students, if the class were improved by nomination by the Board of Admiralty?—I am perfectly certain in my own mind that you would get them.

6936. Do you think it would be advisable, and do you see any difficulty in the way of providing in the dockyards some place for the engineer students to live and mess in?—I think it would be a very difficult matter to provide any place inside the dockyard walls as a residence for any officer of that sort, because you see you have no means of keeping things in order. I think that you must still allow them to go outside.

6937. The difficulty is that if you take them from the country, where are they to live outside the dockyard from the age of 15 to 21. It has been suggested that a hulk might be provided for them under the charge of a naval engineer?—Would these people be under the dockyard authority, or under the authority of the steam reserve?

6938. Under the steam reserve?—If under the steam reserve, there is no difficulty whatever, because then you could put them into a vessel that was appointed and fitted up for that purpose. I think myself that the steam reserve in its present state is not what it should be at all. I think that the steam reserve is intended to be an auxiliary to the dockyard.

6939. (*The Chairman.*) Did you think so when you were captain of the steam reserve?—I did, and worked it out most thoroughly, never having the slightest difficulty.

6940. (*Captain Dowell.*) Have you thought at all which are the best trades to enter amongst the engine-room artificers?—That trade which is connected strictly with the engine-room, and with the erection of machinery.

6941. In no case would you enter a blacksmith?—A blacksmith should be amongst the stokers. There are some very intelligent blacksmiths now,

and they come forward as engine-room artificers, and are entered as such.

6942. (*Captain Commerell.*) They are engine-smiths?—Yes.

6943. (*Captain Dowell.*) Have you in your experience ever come across engine-room artificers who have been thoroughly unfit?—I have seen and heard complaints about engine-room artificers being inefficient.

6944. (*Captain Commerell.*) Are you aware that the engine-room artificers when entered in the service, are not put through any practical test by the steam reserve as to their knowledge of the trade which they profess?—I believe that to be the case now, but it was not the case at Devonport when I was in the steam reserve there; Mr. Bardin would not sign the certificate without seeing the work that the men had done; the men used to go through two or three days' trial under Mr. Bardin before they were entered.

6945. How is it that such a thing has been allowed to creep into the service?—It is the regulation that they are not to be examined practically.

6946. Have you any difficulty in getting good engine-room artificers at Chatham?—That is under the captain of the steam reserve, I do not interfere with them.

6947. (*Mr. Wright.*) I did not quite clearly understand your suggestion that you would make sub-lieutenants keep a watch in the engine-room; did you mean that it was to educate them for the position which they would subsequently hold, or that they were really to assist the engineer?—In order to give them a practical knowledge of that part of their profession in which they should be most efficient. If you are to direct the engineer, you must know how to tell him what he has to do.

6948. And for the time being you would expect them to make themselves useful in the engine-room under the engineer in charge?—Yes, to keep watch with the engineer, and to reduce and increase the number of revolutions, and all that sort of thing; the engineer to have his assistance in that.

6949. He would not be responsible in any way?—No, he is there for instruction only, to add to his knowledge and proficiency; that was a thing that Admiral Sir Robert Smart was most anxious about. With regard to the engineers, I am certain that the best way of improving their position is to abolish the engineers' mess.

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(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

THURSDAY, 18TH NOVEMBER, 1875.

PRESENT :

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

SAMUEL CLEMENTS, Esq., R.N., called and examined.

6950. (*The Chairman.*) Where are you now serving?—I am on half-pay.

6951. What was your last ship?—The "Sultan."

6952. For how long were you chief engineer of the "Sultan"?—About three years and three months.

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6953. How long have you been a chief engineer?—17 years.

6954. From where did you enter the service?—I was brought up in the service. In 1848 I became an assistant engineer of the third class.

6955. Were you brought up in the dockyard?—Partly in the dockyard and partly afloat.

6956. Were you an engineer apprentice?—Yes.

6957. What half-pay are you receiving now?—14s. per diem.

6958. Since you have been a chief engineer, for how long have you been on half-pay?—I think about two years and three months, to the best of my recollection.

6959. At what age were you made a chief engineer?—I was a little over 31.

6960. How many engineers had you in the "Sultan"?—Nine engineers and the chief, four engine-room artificers, eleven leading stokers and fifty-six stokers.

6961. We have had it in evidence from many engineers in the service that it would be desirable to reduce the complement of engineers in each ship and to enter engine-room artificers in their place, what is your opinion upon that?—I think that it would be very desirable.

6962. Did the engine-room artificers in the "Sultan" keep watch in the stokeholes?—Yes, when steaming at the ordinary speed, but not when steaming at full speed.

6963. In how many watches were the engineers?—At very slow speed in four watches, at full speed and high speeds two watches.

6964. Then you had an engineer in the stokehold?—One in each stokehold.

6965. What trades were the engine-room artificers?—One fitter, two blacksmiths, and one coppersmith.

6966. No boilermaker?—No.

6967. When you speak of blacksmiths do you mean ordinary blacksmiths or enginesmiths?—One was an ordinary smith and the other was an enginesmith.

6968. Were the two blacksmiths of equal value?—Not quite. I think the enginesmith was the most valuable man of the two.

6969. Do you think it is desirable that blacksmiths should have the rating of artificers, with the same pay and position as fitters or boilermakers?—I think they should be the same, but a very much smaller proportion of blacksmiths than fitters should be entered.

6970. Do you think that the blacksmiths should be limited to enginesmiths?—Yes; I think it would be very desirable.

6971. Had you any blacksmiths amongst the stokers?—Yes, a few, but they were of no value as workmen.

6972. Were your four engine-room artificers as a rule useful men did they know their trades well?—Yes; they were very useful men indeed in their sphere.

6973. Which do you think would be the more useful man for the repair of engines; an engine-room artificer of average capacity, or a young engineer who has just joined the service. I mean only as regards the manual work of repair?—I think, if there were a sufficient number of engine-room artificers, with one engineer to superintend the work, it would be more desirable than the present plan.

6974. Which do you consider the better workman, simply as workman, a young engineer, who has just entered the service, or an engine-room artificer who has served his trade as a fitter; I mean to turn out a job of work as regards workmanship and time?—I have known young engineers to be far superior workmen to any fitters that I ever saw in the service.

6975. What do you think would be the advantage resulting from reducing the number of engineers and introducing engine-room artificers in their place?—The result would be, I believe, that the engineers, instead of being kept so long in the subordinate

ranks would be promoted at an earlier age, and would be much more satisfied with their lot, instead of being so discontented, as I believe they are at present.

6976. That end would not be gained unless the whole number of engineers on the list was reduced?—No.

6977. Supposing we could not afford to reduce the number of engineers on the list, seeing that we should want them for an emergency or in case of war, would any advantage result from reducing the number of engineers in each ship?—I think we could afford to reduce the number of engineers, if we had a sufficient number of engine-room artificers who were competent men. I think that the repairs and watch-keeping could then be done very well.

6978. Do you think it would be advisable to put chief engineers into smaller ships than is the case at present?—Yes.

6979. Into what size ships would you put them?—I would myself say ships of 150-horse power nominal. For instance, the double screw vessels of the present day have very complicated machinery, and there is a great deal to look after, that I think a junior chief engineer should be appointed to such vessels.

6980. If it enabled us to increase the number of chief engineers, that in itself would expedite promotion?—Yes.

6981. What complement of engineers would you give to a vessel of 150-horse power nominal, one of the twin screw vessels?—I have not quite taken into consideration the staff required for all the vessels.

6982. Say a vessel of 150-horse power; what number of engineers would be the least number that you would put in?—I think that one chief and two engineers would be a sufficient number of engineers to make up the complement for watch-keeping.

6983. Do you think that an intelligent engine-room artificer, after being three years at sea, would be capable of taking charge of the engine-room in a small ship?—Under the superintendence of an engineer. I do not think it is desirable to place the machinery in charge solely of an engine-room artificer at any time, either for watch-keeping or otherwise.

6984. Supposing you had only two engineers in that class of ship, would you make them keep watch and watch all their lives?—They would simply have to superintend.

6985. How would they superintend at night; they might be only just up or asleep?—Perhaps there may be occasions, during the day watches, when it would not be necessary for them to be there; but for the night watches, when more care is required, I think it would be desirable and necessary that an engineer should be constantly in attendance.

6986. In the engine-room?—Yes.

6987. Are you aware that for some years past, in a great many ships in the service, engine-room artificers have had charge of a watch in the engine-room of necessity?—I dare say that occasions have occurred when engine-room artificers have been required to keep watch, but I think they are very few. I have been, for a great number of years, chief engineer myself, and I never saw that occasion arise yet.

6988. In the "Sultan" did you give the engine-room artificers a certificate that they were capable of taking charge of the engines?—Yes, after they had been more than three years in the service; still I believe it necessary that an engineer should be in attendance to superintend the watch-keeping.

6989. In the "Sultan," when you were in her, who had special charge of the water-tight doors and sluice valves, and double bottoms?—One engineer, with a staff of mechanical men and stokers. One engineer, one stoker-mechanic, and six stokers looked after, and kept in order, all the pumps and water-tight compartments, doors and sluice-valves, and all the work of that nature, out of the engine-room.

6990. The small engines?—He had nothing to do with the small engines.

6991. Who had charge of those?—Another engineer was stationed to keep those in order.

6992. When steaming at sea, were those six stokers excused watch?—Yes, except at very high rates of speed, or when we were short of hands from the men being in prison or on the sick list in hospital, and so on, then it was necessary to put a sufficient number in to make up the complement for watch-keeping.

6993. During your commission, how often did you go at a high rate of speed in the "Sultan"?—Very often indeed; when steaming, for instance, in Norway up the Fiords, we were going full speed frequently, steaming round the coast and in and out the ports, ten and sometimes eleven knots speed.

6994. With the channel squadron?—Yes.

6995. You would not call that a high speed, would you?—I call it a high speed, twelve and a-half knots is the most that they can get out of her when she has rather a foul bottom.

6996. When you speak of high speed, do you mean using all your boilers?—Five boilers, and sometimes the whole of them.

6997. How many boilers has she?—Ten boilers altogether.

6998. On those occasions, when going at high speed, did you use all her boilers?—Yes, except a small 20-horse power boiler on the lower flat deck, which was seldom used, except for full-speed trials.

6999. Where did the engine-room artificers mess in the "Sultan"?—On the engine flat, in a very dark miserable place.

7000. Had they a mess to themselves?—Yes.

7001. Who cleaned their mess?—No one at all. I appointed, with the captain's sanction, a stoker to clean their mess, a second-class stoker.

7002. Do you call that no one at all; was not that all they wanted?—Yes, but he could be very ill spared from the engine room.

7003. Did the engine-room artificers complain much about their treatment on board?—They complained of wanting a proper place in which to mess, where they might have light and ventilation.

7004. Where would you put them then?—I would put them somewhere on the main deck, where they could have fresh air and light.

7005. Was any body else messing on the main deck?—All the ship's company, except the engine-room artificers; the stokers, bandsmen, and ward-room servants messed on the engine flat. I would put the engine-room artificers on some other deck, or some other flat where they would have light and ventilation; but the place appointed for them to mess in has not those advantages. It was through the kindness of Captain Hoskins that their mess place was shifted; it is on the same side and on the same flat, but it has been shifted opposite two scuttles; it was between the end of the store room and the engine-room hatchway, and the temperature was very high, and the place was very dark.

7006. Are you aware of the place in which they now mess?—Yes.

7007. Do you think that a suitable place?—Yes, very suitable, where they now mess.

7008. Had you, or one of the engineers, the responsibility of their mess being kept clean?—The engineer in charge of the double-bottom compartments and pumps looked after the engine-room flat deck during the latter part of the time. When I superseded my predecessor, Mr. McKie, the senior engineer had charge of that flat, but I considered that so undesirable that I applied to the captain to have him removed in order that he might give me efficient assistance, and allow a more junior engineer to do that duty, which was eventually the case.

7009. Had the master-at-arms any thing to do with the cleaning of their mess?—No, nothing at all.

7010. How did they apply for leave?—Through me.

7011. Through you to the commanding officer?—To the master-at-arms, and then to the commanding officer.

7012. In what way did they go to the master-at-arms?—A list was submitted every night.

7013. Had the master-at-arms the power to prevent the men going or not?—The list was given to the master-at-arms for his information.

7014. Was there any difficulty about them getting leave at any time?—No, they certainly only went when the ship's company were allowed leave; they were not allowed to go at any other time.

7015. That is to say, when the other chief petty officers went on leave?—Yes, those of corresponding rank.

7016. Do you think that the pay of the engine-room artificers is satisfactory and sufficient to enable us to retain them in the service?—No, not at present.

7017. What would you suggest now?—I would suggest this with respect to the pay of engine-room artificers, I beg to submit that it should be progressive every three years, that it should commence at the same rate as at present, but be progressive.

7018. Up to what at the end of ten years?—Say to progress at the rate of about 9d. every three years, until they are pensioned, commencing as at present.

7019. Can you suggest any means, other than we have at present, of obtaining engine-room artificers from the private trade or from our factories? Would you like to see them got from our factories or from the private trade chiefly?—I think from both. I think that if sufficient inducements were held out to them to enter the service they would come to us from the private trade.

7020. What inducements would you hold out besides those of which you have spoken?—With respect to rank, I would suggest that they should enter as at present, their pay should be progressive, as I have already stated; and with regard to their uniform, I think it would be desirable to allow them to wear a frock coat the same as other chief petty officers of their own rank, such as the writer, the schoolmaster, the police, and so forth. I think also that more consideration should be given to their messing and berthing. On board the "Sultan" they sleep with the stokers, which I do not think is at all desirable.

7021. Was that during the last commission, or do they now?—I believe they do at present, unless the berthing has been altered since I left the ship. With regard to their messing, if on board other ships they had a similar mess to that which they have now on board the "Sultan" I think it would be sufficient, but I would give them a better place to sleep in, and apart from the men, from whom they expect a certain amount of respect. I think it would be necessary to give them a boy, or some one to look after their mess, so as not to have to take them away from the engine-room staff, which is solely allowed for steaming, for that purpose.

7022. (*Captain Commerell.*) Do not you think that the deck people would hesitate to give a boy from the deck for that purpose?—I think the complement should be increased to allow of that being done, so as not to take away either from the strength of the deck or the strength of the engine room.

7023. (*The Chairman.*) Are you aware that the complements of our ships are just as much as the ship can carry?—Having due regard to that, of course, I mean; but at the same time these men are employed in the engine-room all day, and frequently for the greater part of the night, and I cannot see how it is possible for them to cook their own provisions, and clean their own mess, and lash up their own hammocks, and do those sort of things.

7024. The point is whether a second-class stoker should do it?—My experience is that that takes away from the strength of the engine-room, and it cannot be afforded.

7025. What duties would this attendant on the engine-room artificers have during the whole day; for what hours would he be required to be attending upon them, cleaning their mess and cooking their meals? What else would he have to do for them?—To get their water ready for washing, and

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clean up and wash the place afterwards, and so forth ; various duties.

7026. Who as a rule cleans up the stokers' wash-place?—They themselves, under the charge of a petty officer, who reports to the engineer.

7027. Do not the engine-room artificers use the same wash-place?—They have hitherto, but I do not think it is desirable that they should.

7028. Do you think it would be a good thing for a boy to be excused from off the deck in order to clean up the stokers' wash-place?—No; I do not mean to say that any one should come from off the deck to clean up the stokers' wash-place. All I say is this, that the engine-room artificers should have some separate place to wash in, and that the same person who cleans up their mess should clean up their wash-place afterwards.

7029. Have you any opinion to offer to the Committee on the subject of the pay of the engineers?—Yes.

7030. What would you suggest?—Commencing with the inspector of machinery, I think that the pay of an inspector of machinery, whose duties are very responsible, should be £2 per diem; and that the junior inspector of machinery, whom I should suggest might be called deputy inspector of machinery, should receive pay at the rate of £1 15s. per diem. I propose two ranks, as at present; but, instead of chief inspector of machinery, I would drop the word "chief," and add the word "deputy" to the junior inspector; merely inspector of machinery and deputy inspector of machinery. The half-pay of those officers should be 21s. and 18s. per diem respectively. On retirement I would suggest that all their time should be allowed to count; that they should not be deprived of a portion of their junior time, as is the case at present.

7031. Do you mean all time from their first entry?—Yes, all time from first entry into the service. At present a great many inspectors of machinery are not allowed to count all their junior time which may vary from two, three, or six years.

7032. In fact none of them can count it all?—No, most of us chief engineers, after serving eleven years as such, are deprived of a certain amount of junior time; in any case I shall be deprived of four years, and during that four years I was serving on board the "Arrogant" in the West Indies, and in various other parts of the world, in charge of a watch very frequently and having responsible duties to do; still I am not allowed to count that time towards increase of full or retired pay.

7033. Have you anything to suggest with regard to the pay of chief engineers?—I would suggest that the pay of chief engineers should be progressive, as at present, every three years, commencing from 15s. per diem and increasing 2s. per diem every three years, but I would abolish charge pay; after 11 years' service they should count all their time for increase of full, half and retired pay. Chief engineers are also deprived of the privilege of being allowed to count all their junior time. I would suggest, as with inspectors of machinery, that chief engineers should be also allowed to count all their time from first entry into the service; that would include engineers' time, first and second assistants' time, and third assistants' time as formerly from 1847, I think it was.

7034. You would give a chief engineer the same pay, whatever ship he was in charge of, irrespective of the size of the engines?—Yes, and let his pay be progressive.

7035. Irrespective of the duties he had to perform and the size of the engines?—Yes; of course I would prefer appointing an experienced chief engineer to the larger ships and a junior chief engineer to the smaller ships; I would always give that preference. I may perhaps not be out of place if I mention that chief engineers, I believe, generally think it a very great hardship and grievance that they are not allowed to count all their junior time.

7036. Have you any suggestions to offer with regard to the pay of engineers?—The pay of engi-

neers on entry into the service, I propose, should commence at 8s. per diem, and I would abolish the ranks of first and second assistants, and allow them to enter as engineers and to increase 1s. per diem every three years.

7037. What is your reason for proposing that they should have such a large increase of pay on first entry into the service. Is it because we cannot get engineers?—I think that their duties are of a very arduous and responsible nature, even directly they enter the service, and that 8s. per diem would not be too much for them to receive. I propose to abolish the ranks of first and second assistants.

7038. (Captain Dowell.) In proposing to give them that amount, have you taken into consideration that they have been educated and taught all that they know at the government expense?—Yes. I propose to abolish the charge pay, and they should receive an increase of 1s. per diem every three years. The duties of an engineer in the tropics are of a very arduous nature. In the Red Sea, and in those parts, the day's work is of a very arduous nature indeed, and the duties are very responsible, more especially when in the channel squadron. I have had to keep watch in an engine-room in the Red Sea with a temperature of 130 and 140, shortly after returning from a place near the arctic regions, off the river Amoor, where the ice formed four inches thick in one night in a tub on the deck; those extremes are not very conducive to health. I wish to mention that we were on watch and watch in the Red Sea six hours on and six hours off. When you take all those things into consideration you will see that our requirements are different from those of other officers who have to keep watch on deck.

7039. Do you suppose that those engineers when they enter the service are competent to keep a watch?—They are supposed to be competent to keep a watch when they enter the service.

7040. You know the way in which they are educated, and the examination that they have to pass?—Yes.

7041. Do you think that any portion of that education will make them efficient in that respect?—They are supposed to be fully competent to keep a watch when they leave the college, and they are in some cases appointed to small ships where there is only another engineer besides themselves, or perhaps two or three engineers.

7042. (Mr. Wright.) Oh, no; you are mistaken?—It may be different now; but I was myself appointed in that way to the "Arrogant."

7043. (Captain Commerell.) Would you, as chief engineer of the "Sultan," like to entrust the watch to one of those young men who had just entered the service?—No; certainly not, until he had passed through a probationary period.

7044. Then in the meantime you would give him 8s. per day?—I have nothing to do with that probationary period. I speak of an engineer when he is fully competent to keep watch.

7045. But by your own showing he is not competent?—Let them have twelve months of probationary time then. Engineers on first entry into the service have been sent to us as young men fully competent to take charge, but I am quite aware that you have to look after them very closely.

7046. Are you aware that an engineer student, during the time when he is receiving his education, has no means whatever of learning the practical work of an engine-room?—I am quite aware of that, except on some occasions when he is sent out on trial trips, but that is not sufficient to instruct him.

7047. If you had the option of proposing a progressive increase of pay to the engineers, would you sooner give it to the upper half of the engineers, or to the lower half?—I cannot make any distinction between them. I think that they ought to receive that amount when they are competent to keep a watch. I am, of course, quite prepared to say that they should prove their competence to do their duty

as engineers before they have it, as a matter of course.

7048. (*Captain Dowell.*) To what should their pay rise?—Their pay should be progressive every three years at the rate of 1s. per diem.

7049. (*Captain Commerell.*) Do you think that the engine-room artificers whom we have at present in the service are desirable men, and the sort of men that we should have?—I think that they would do after a few years more experience. I think, to be entrusted with watch-keeping, that they require more experience than they possess at present, and then they should be under the supervision of an engineer. I would suggest that a larger proportion of fitters than blacksmiths should be entered if they can be procured.

7050. Are you aware that when engine-room artificers are entered in the steam reserve they are not examined as to their practical knowledge of the trade which they profess?—I think there is a regulation which requires them to give a proof of their practical ability, and I think that, as a rule, that regulation is carried out.

7051. We have had it in evidence here from the chief inspector of machinery at Chatham dockyard, that they are not examined practically as to their knowledge of their trade?—I think that the regulations require that they should be.

7052. Do you consider that their indentures should be sufficient to satisfy us?—I think that if they were from a respectable firm they might be.

7053. Do you think it would be better if we examined them ourselves and saw whether they answered all our requirements?—Probably it would be a good thing to do, still I think if their indentures were signed by a respectable firm it would be a sufficient proof of their practical ability.

7054. Have you found any of the engine-room artificers with whom you have had to deal fall short of what they ought to have been?—Not at all; they were men that were fully competent to do what you would expect them to do.

7055. Fully up to their wages?—Yes; I think they deserved more consideration in a few items, in the way I have mentioned, that is to say, in the way of messing and progressive pay.

7056. Have you considered the question of doing away with the engineers' mess?—Yes.

7057. Are you in favour or not of doing away with it?—Yes, when the number of engineers is reduced I am in favour of abolishing it and allowing the engineers to mess in the gun-room, and after a certain number of years servitude, say six years, I would suggest that they should mess in the ward-room; and in ships where it was practicable they should be allowed a cabin.

7058. Should they all have a cabin?—I think the seniors should have a cabin where practicable, having due regard to the room on board ship. I think those who are entitled to mess in the ward-room should have, where practicable, cabins.

7059. Are you altogether in favour of the present system of entry of engineer students?—Yes, I think the present system appears to be most perfect, with, perhaps, only one exception that I know of, and that is that I think a little more attention might be given to their practical training.

7060. You think that in all respects the young men who enter as engineer students, socially and in an educational point of view, are everything that they should be?—I know very little of their social status, but I may be allowed to observe, perhaps, that most of the engineers whom I have met have been very respectable men, in fact, the majority I believe, have been men of refined habits; there may be a few exceptions, but I believe they are few and far between, not very many.

7061. Just look at that list, which gives the parentage of the engineer students (*handing the same to the witness*)?—Many, probably, are taken from the lower stratum of society, but they are mixed, and all

that I have known have been very respectable men. I think that if the regulations of the service be carried out strictly, that they shall give proof of their respectability, it is sufficient.

7062. Are you aware that at the present time there is no inquiry whatever made as to the character of the young men who enter as engineer students?—I certainly would give the preference to those whose parents were respectable.

7063. (*Captain Dowell.*) A dockyard labourer may be a very respectable man?—Quite so, you cannot measure a man's respectability by the weight of his purse.

7064. Do not you consider that the social position is anything?—Yes, I would prefer giving nomination to those who gave proof of their respectability.

7065. (*Captain Commerell.*) Then you would rather have nomination than open competition?—I do not see any reason why you should not have both.

7066. But would you allow any body whatever to compete?—I would give nominations to those who showed proofs of their respectability.

7067. Without regard to the length of the purse?—Yes, without regard to the length of the purse.

7068. Are you aware that during the education of these engineer students, from the age of 15 up to 21, they are of course going home to their friends and mixing exactly in the class of society from which they come; do you think it would be prudent, under those circumstances, at present to put those young men immediately into the gun-room mess; would it be either satisfactory to themselves or to others?—I think the majority of engineers, at present in the service, are very respectable men, and it would be doing them an injustice to keep them out of the gun-room any longer. I would suggest, in reducing the number of engineers, that you should give such men the opportunity of retiring as early as possible.

7069. We have had it in evidence from several of these young men that though they are very anxious, and rightly so, to enter the gun room-mess, they would not advise such a thing themselves under the circumstances shown by that list. Are you of that opinion or not; that list shows the young men who have entered during the last three years, and with whom we have not yet had to deal?—It is possible that there may be some here who are not fit, in a social point of view, to enter the gun-room mess; but there are some that are, I think, very respectable, and I think it would be doing the majority of engineers now in the service an injustice to keep them from such a position at the expense of the few; it will be found in all classes that men are more or less drawn from the upper and lower strata. The regulations require that nominations shall be given to respectable people, that they should be called upon to give proofs of their respectability. Of course he must be a clever youngster to be able to get in at all.

7070. (*Mr. Wright.*) You expressed an opinion that engine-room artificers should not be in charge of a watch in small ships, and I think you said that they should not be in charge of a watch in the stokehold of large ships when going at full power; if you limit the duties of the engine-room artificers to such an extent as that how can you reduce the number of engineers?—I suggest that in large ships one engineer should be always on duty, and I would let him be constantly going round and supervising the work everywhere.

7071. In the case of the "Sultan," will you tell us how many engineers you could do with; at present there is one chief engineer, nine engineers, and four engine-room artificers?—For the present I think that the complement could be reduced to six engineers and a chief, or a senior chief, a junior chief, and five engineers, that is for the present; but it is possible that, after a few years' time, when we have gained more experience, the complement might be still more reduced; and I think at present, in order to have a sufficient number to keep watch and to superintend the work efficiently, there should be at least six

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engineers and a chief, or two chiefs and five engineers.

7072. Your opinion is, that the engine-room artificers should not be in sole charge of a watch, but an engine-room artificer could keep watch under the general supervision of an engineer?—Yes, exactly, under the general supervision always of an engineer; and I wish it to be distinctly understood that that engineer is not to be confined to the platform of the engine-room. I would allow the engine-room artificers in the engine-room to keep the log and go on with the general duties the same as the engineer at present does, and the artificer in the stokehold should go on with the duties as if an engineer were not present; but still all the engine-room artificers' work should be under the supervision of one engineer, who is to walk about everywhere to see that the duties are properly and efficiently performed.

7073. (*Mr. Covey.*) You say that you think the junior engineers are better workmen than the engine-room artificers?—If you refer back you will find I have stated, that I have known some junior engineers to be far better workmen than any engine-room artificer, but I quite believe that many engine-room artificers in the service at the present moment are very able and good workmen indeed. I speak from my experience of those we had on board the "Sultan," they were very good workmen indeed, and there was only this objection with them, namely, that they had been for only a short time in the service, and therefore had not the experience of men of more mature age; they were all young men, and when I joined the "Sultan," they had only been twelve months in the service, and you cannot expect an enginesmith or a blacksmith to be of very much service on board under those conditions; it is more than you can expect, but certainly after three years' experience they will get very useful men in watch-keeping, as well as in doing the general work of the engine-room.

7074. In your case in the "Sultan," you had some engine-room artificers to assist you in putting a patch on one of the cylinders; should you have preferred a young engineer or an engine-room artificer to assist you in that?—If you give me that case, I must say that I would rather have an engineer.

7075. In repairing boilers, which would you rather have, an engine-room artificer or a young engineer?—The majority of engine-room artificers are certainly the most able men for that kind of work, for smithing and screwing bolts, and all that sort of thing. Where one engine-room artificer has a great deal of work to do of one particular description, certainly he would be the best man to get through a lot of the rougher sort of work in the shortest time.

7076. (*The Chairman.*) You spoke of not wishing to see the engineer of the watch confined to the platform of the engine-room?—Yes.

7077. Who would you leave on the platform when the engineer is moving about when cruising in a fleet?—The engineer would be constantly moving round the engine-room, and I think the engine-room artificers would be quite competent to change the speed if necessary; the engineer would not be absent from the platform for any very lengthened time, and would be quite at hand to meet any emergency which might arise.

7078. When he left the platform he would leave the engine-room artificers in charge while he went round the stokehold and shaft passage?—Yes.

7079. Have you ever in your experience had any trouble in being compelled to give orders to the seamen or others out of the stokehold, and have you found any difficulty in getting those orders obeyed?—Yes, a very great trouble indeed, especially when men from the deck are sent into the stokehold to assist in steaming.

7080. Have you on those occasions reported them to the commanding officer?—I believe I have sometimes, but as a general rule the seamen, and class of men that are sent to assist in coal trimming and

stoking, do not do the amount of work that they might do.

7081. But have you ever found them refuse to obey your orders?—No.

7082. They did not consider that they were not amenable to your instructions?—No; I have never met with that.

7083. (*Captain Commerell.*) What extra pay does a seaman get for working in the stokehold?—The old regulation was, that he should be paid the difference between his and a stoker's pay; now they are allowed, I think, 1s. a-day extra, irrespective of their rating.

7084. (*Captain Dowell.*) You said that you thought a chief engineer ought to commence on 15s. a-day; at what age do you think he ought to be made a chief engineer?—I think at 30, or 31 at the outside.

7085. How would you promote them, by seniority or by selection?—I think the present system of seniority is a very good one.

7086. Is it not seniority now?—I think it is generally, leaving aside those who have not fulfilled the requirements or not passed the examination.

7087. So long as they pass the examination you would be satisfied?—I think I would prefer their passing the examination, unless it was an exceptional case. I think we ought to prefer those who have passed the examination and given proof of their practical abilities and educational acquirements. I am an advocate for seniority tempered by selection.

7088. (*The Chairman.*) Have you any further suggestions to offer?—I will just remark this, if you will allow me, with respect to the inspectors of machinery. I think that the junior should be styled deputy, and that after three years he should rank with a senior captain; that a deputy inspector of machinery should be appointed to all stations having an admiral in command; that the principal engineers in each of the dockyards, Portsmouth, Devonport, and Chatham, be of the rank of inspector of machinery. The chief engineer should rank as at present, with this exception, that after 10 years they should rank with a commander. I beg to submit that the title of chief engineer, with 10 years' service, should be that of fleet engineer.

7089. (*Captain Commerell.*) Are you in favour of chief engineers not counting their time until they have been for 11 years in that position?—I would let their pay be progressive; after 11 years count all time.

7090. You are aware at present that no chief engineer can count the whole of his time until he has been 11 years in that position?—I think that the present regulation to count two years after three, and so on, is very good, and I would allow him to count the difference after 11 years' service in that rank. In the present case, at the rate of promotion now, it is quite impossible for them to be able to count their time. One instance occurred in the "Sultan"; an engineer was promoted to the rank of chief at 42 years' of age, and it occurs to me that that officer can never get in his 11 years' service.

7091. Are you for retaining that limit of 11 years?—Under the present circumstances it would not be desirable.

7092. You cannot make exceptions, you must either have it or not have it?—I am for the retention of the 11 years, provided the engineers are promoted to the rank of chief at the age of 30 or 31. I wish it to be distinctly understood that the chief engineers think it a grievance that they are not allowed to count all their junior time after 11 years' service. I think that engineers should be allowed (especially those who are on the list and cannot be in the order of things promoted) a more liberal scale of retirement, so as to induce them to retire.

7093. (*The Chairman.*) At an earlier age than at present?—Yes, those that are on the list at present. I would suggest also that the number of engineers be reduced about 8 per cent. every year, until we reduce them to about 500.

7094. (*Mr. Wright.*) That is engineers below the rank of chief?—Yes, all engineers; that is bearing in mind that the ranks of first and second assistants are abolished, and that their places be supplied by competent engine-room artificers, care being taken that a sufficient number be appointed to vessels to keep a watch and efficiently superintend the work. With respect to the manual labour, I do not think it is desirable that so much should be expected from the engineers; they should, I think, do the duty of superintending more than they do at present, and yet still be thoroughly competent to perform the manual work, so as to be able to judge whether it has

been done well or not, or do it themselves if necessary.

7095. (*The Chairman.*) Have you any other points to suggest?—That is all, I think, with respect to inspectors of machinery, chief engineers, engineers, and students. With respect to engine-room artificers, I think that there should be an increase to meet the decreased number of engineers, and that a larger percentage of fitters be entered than blacksmiths; also that a sufficient number of pattern-makers, moulders, and coppersmiths, should be sent to stations abroad, and should be in a squadron in order to execute efficiently the repairs necessary to vessels.

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(*The witness withdrew.*)

WILLIAM EAMES, Esq., R.N., called and examined.

7096. (*The Chairman.*) What position are you at present holding?—I am chief engineer at Chatham dockyard.

7097. What number of engineer students is there at Chatham dockyard?—33 at present.

7098. How long have engineer students been admitted in Chatham dockyard?—For about five years.

7099. Then not any of them have left you for the service yet?—No, not any.

7100. Have you any suggestions to offer to the Committee as to the training of the engineer students in the dockyard?—With the exception of giving a little more time to their practical work, I have no other suggestion to make.

7101. What time, in addition to that which they have at present, would you recommend being given to practical work?—I should say that one half of their present school time could be given to it.

7102. Then I presume that you would lower the standard of examination very much indeed?—I do not think that is necessary.

7103. Do you think that with one-half of the time which they at present pass at school they could be prepared to pass the same examination as they have to pass now?—I would alter somewhat the standard of education in certain parts of the educational test.

7104. In what parts?—In the higher branches of mathematics, and I would give more time to practical matters. I mean those parts of their scientific education which apply more immediately to engineering, such for instance as hydrostatics and other branches of mechanics.

7105. Can you go very deeply into hydrostatics without a good knowledge of mathematics?—Not very deeply, but sufficiently deep for engineer students' purposes.

7106. Could you go higher than at present in hydrostatics without a greater knowledge of mathematics?—The extent to which I would carry the course of education in mechanics should be such as would coincide with the instruction in mathematics. I would make the two go together.

7107. Do you think it is compatible to give them more education in hydrostatics and less in mathematics?—It does not follow that you should lower the mathematical education to any great extent, and yet you could give them more instruction in hydrostatics, and other branches of mechanics, than they have at present. I consider that the extensive application of hydrostatics, &c., cannot be learned without a good knowledge of mathematics, as a matter of course.

7108. You consider that with half the amount of schooling which they receive now you would be able to raise their standard of examination, in hydrostatics for instance?—Yes, by neglecting other subjects in their education.

7109. Such as mathematics?—The higher branches

of mathematics, such as the differential and integral calculus and trigonometry.

7110. Do you know to what they apply the higher branches of mathematics?—Except so far as engineering is concerned, I do not know of any other subject.

7111. Are any of the branches of instruction in dynamics, hydrostatics, and mechanics involved in it?—Yes.

7112. Do you consider that dynamics, hydrostatics, statics, and mechanics are useful branches of education for engineers?—Most certainly.

7113. Do you consider that they could get a knowledge of those subjects without going into the higher branches of mathematics?—I think that they might have sufficient knowledge without going to the extent to which they do now in the higher branches of mathematics, such as the differential and integral calculus.

7114. Cannot they receive a certificate on passing out without a knowledge of the differential and integral calculus?—They are supposed to have some knowledge of it.

7115. Do you consider that the time which they pass in the fitting shops is usefully spent?—Yes, I think so.

7116. Would you recommend any improvement in their practical training while in the dockyard; in the mode of teaching them?—I do not know that you could well do more than you do at present. You put them into the different shops at different stages of their time, in order to afford them an opportunity of seeing how the work is carried on.

7117. Who instructs them?—The leading man.

7118. One man for all the workshops?—One leading man has general charge of all the students while in the workshops, but the leading man of each workshop would instruct them in the duties to be performed there.

7119. You are quite satisfied with the way in which they occupy their time while in the workshops in their practical training?—Yes, I am satisfied with their progress, so far as the time will admit.

7120. Do you think that they keep pace with the trade boys in the dockyard?—They can scarcely do that, because the trade boys are never removed from practical work and the engineer students are.

7121. What do you think is the principal duty required of an engineer when he is appointed to one of our large ships?—I suppose that the first duty is to be able to keep watch over the engines and boilers.

7122. And after that?—To be able to direct or to take part himself in the repair of any portion of the engines and boilers.

7123. Those are the chief duties of an engineer?—Yes, those are the chief duties.

7124. Do you think that the work, solely and entirely of the fitting shop, would enable a man to qualify himself for those duties on going afloat?—No, not without some experience of seeing

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ships under way. I mean not without the actual experience of seeing machinery under way.

7125. Do they get sufficient instruction in that respect, at present, do you think?—They get as much as we can give them, with our opportunities at Chatham, but those are few in comparison with those at other dockyards.

7126. Do you think that they get sufficient to enable them to take charge of engines on going to sea?—I do not.

7127. Do they get any instruction in the construction of marine steam engines?—So far as opportunities admit, they do.

7128. How far do they go?—According to the repairs necessary, and the extent of work to be done.

7129. How many hours schooling a-day have they at present, in the fifth and sixth years of their time?—I could not say exactly right off without referring, but they have what they are ordered to have by the Admiralty.

7130. Are you aware that they are not allowed any schooling in the day, during the fifth and sixth years of their time?—Yes, during yard hours.

7131. Then how would you reduce that amount of schooling?—It could not be reduced at all, as a matter of course.

7132. In the fourth year what do they have?—I cannot say without referring, but they have whatever the regulations allow; it is two hours for two evenings a-week and one afternoon, so far as I can recollect.

7133. Does their evening schooling interfere with their work in the fitting shop?—No, but the afternoon schooling does.

7134. During the first three years, the engineer students attend the dockyard schools two afternoons in the week, and you would wish to see that reduced to one afternoon?—Yes.

7135. You think that would give them quite as much knowledge as any engineer need have?—I should think it ought to, in addition to their own exertions.

7136. Do the students in Chatham dockyard attend drawing classes, or receive instruction in drawing at all?—Yes.

7137. When?—On two afternoons in the week, Mondays and Thursdays, at Chatham.

7138. Does that last during the whole of their time, or at what time do they attend those classes?—It is in the fourth year of their time.

7139. Do you think that is sufficient instruction in drawing for them?—I should like to see them devote more time to it.

7140. As regards their six years' training in the dockyard, you think that the work in the fitting shop is the most important part that they can be instructed in?—Yes; fitting and erecting.

7141. You would not wish to see any of that reduced under any circumstances?—No.

7142. Would you want it increased if anything?—Yes, rather.

7143. In what way would you give an engineer student, who is to become an engineer in one of our large ships, a knowledge of the construction and design of the steam-engine, and the mode of controlling it?—First of all by drawing.

7144. When, and in what time?—In those times when he is employed in the afternoons upon that work.

7145. In the fitting shop do you mean?—He has a certain number of afternoons for drawing; two hours for two days in the week for a year; during which time he is allowed to make drawings in the drawing office; and he would have tracings and sections of the various parts of engines to make; in addition to that, he would go on board ships, especially for repairing engines, under the superintendence of the leading man; and the engines would be opened up and his own observation must assist him in learning the construction and arrangement of the different engines;

and such things as may be brought under his notice in that way.

7146. You think that two hours for two afternoons in the week in one year of his time is sufficient to enable an engineer student, who is to become an engineer in one of our large ships, to learn the construction of the steam-engine and all connected with it?—Yes, as far as drawing is concerned.

7147. To learn the construction of the marine steam engine I mean?—Oh, dear no.

7148. Then how is he to learn that?—He is learning it all the time that he is employed in the fitting and erecting shop, and on board the ships which are undergoing repair. I consider that his education is always going on when employed in such places as the factory workshops and in ships.

7149. In the fitting shop you think that he is learning the construction and design of the marine steam-engine?—So far as the work in the fitting shop is concerned, he is learning construction. Designing is another matter.

7150. Who teaches him?—The leading man.

7151. Do you think that he knows anything about it?—He is an experienced man, and is appointed for the express purpose of seeing that the engineer students are taught in those matters which they have in hand.

7152. That is as regards the manual work in the shop; but do you think that he knows anything about the construction of the marine steam-engine?—Some of them are well versed in the practical construction of marine steam-engines, and the leading man who gets charge of erecting engines on board ship must be necessarily well acquainted with the construction of them.

7153. We have received evidence from a good many of the engineers of the fleet that they would desire to see more engine-room artificers appointed to a ship and fewer engineers; are you in favour of that?—I am.

7154. With what object; why should you like to see that?—I think it would be a means of affording promotion to and improving the position of the engineers now in the service.

7155. How?—By altering the proportion of assistant-engineers and engineers to chief engineers. I think there are a great many too many subordinates and junior engineers now; and I do not see how it is possible, under the present circumstances, that the subordinate engineers can be made chief engineers until they arrive at an age which is almost too late for them to be available for a very long time after as chief engineers.

7156. Have you any other reason for thinking that it would be beneficial?—I think that you can scarcely expect an engineer to be as expert in the work to be done in the repair of the machinery as a man who has been brought up in a workshop. I mean to say that you cannot expect the engineer students to be good boilermakers, or good coppersmiths, or good blacksmiths, or any other trade in particular. They cannot be necessarily as good workmen as the men who have been kept to one trade during their lifetime; and for that reason, where extensive repairs have to be executed, it is better to have those men to do them, and the engineers, who have acquired a knowledge of all trades, can direct.

7157. Is there any reason why an engineer should be a better educated man than an engine-room artificer?—Yes, I think so.

7158. And you think that one day in the week would enable him to acquire that education?—I assume that an engineer student, knowing the position in which he is to be placed, will exert himself in his own hours, as well as at other times, to instruct himself, in order to fit him for the position which he will eventually hold.

7159. Do you think it within the bounds of human nature, or we will say the nature of lads of 16 and 17 years of age, simply for the attainment of knowledge, to go and work to improve themselves after doing a

hard day's work in the dockyard?—Yes; many of them have done that in order to fit themselves for their prospective position.

7160. But if that position can be attained without it, as you would reduce the examination, is it likely that men would go, after a hard day's work in the dockyard, and work by themselves when no object whatever was to be gained by it?—I think so; if the men knew that they could not get a certain position without certain knowledge, and that if they did not work they would not get that knowledge, then I think they would exert themselves in order to obtain it.

7161. But if that position could be attained without that exertion, how then; you say that you would recommend the examinations to be lowered, you know?—Yes, somewhat; all that I should recommend it to be lowered for would be for the purpose of affording them more practical knowledge, but what educational acquirements they lost in that way should be made up by themselves if necessary. I think, probably, that if you threw the entry of engineers into the service open to all the engineering world, you would find a sufficient number of young men who would qualify themselves practically and theoretically to enter the service as engineers, and that they would do that necessarily without this education which is provided for the engineers in our service.

7162. Do you think that you could get men to pass the examination which we now require them to pass?—Yes, I think so; if they knew it was a means to an end, that they must pass that examination, they would.

7163. Do you think now that engineers would be found to come into our service, having to pass the examination that our engineer students have to pass, before they enter the service?—I think, if you threw it open to competition, you would find men who would be able to pass those examinations. Take articulated pupils, for instance, in large engineering firms; if an inducement were offered in the way of a position, such as to make it worth the while of some of those pupils to enter the service, I have no doubt that then you would get men perfectly qualified to pass the examination. I do not mean the standard of examination which you allude to now, but the lowered examination or modified examination which I would make it.

7164. Do you think, whatever number of engine-room artificers is introduced into our ships, that it is desirable to have a set of well educated men as engineers in the engine-room?—Yes.

7165. Under any circumstances?—Yes.

7166. What advantage would their education be to them?—It would enable them to take their position as officers generally, and it would also enable them in their profession to direct any work that might require to be done in their ships or to the machinery of the ship; when I say the machinery of the ship, I include all the machinery in the ship, gun carriages, slides, and so on.

7167. You think that a certain amount of theoretical knowledge is necessary?—Yes, I think so.

7168. But you think that that certain amount could be obtained by one afternoon schooling in the week during the first three years that the engineer students enter the dockyard?—Yes, that is in addition to their own exertions. It should be borne in mind that for some months in the year the daily hours of attendance at the dockyard are very small, and there is a large margin in the afternoons, during which time the young men could improve themselves by study or anything which they thought proper.

7169. Do you think it would be right then to have the examination higher than that which they could be expected to pass from the instruction which we give them in the dockyard?—I think that you might modify to a certain extent the examination which they have now to pass.

7170. In the dockyard schools?—Yes. I would give them more time for practical work, and would let

them make up any loss that they sustained in that respect by their own exertions.

7171. So far as the practical study is concerned you think it is satisfactory?—Yes; so far as we have opportunities to give it.

7172. Do you consider that our mode of practically training them is satisfactory for the navy?—The only improvement that I would suggest would be to give them greater opportunities of seeing machinery under way.

7173. Do you think it is desirable that they should know anything of engine design and construction?—Certainly I do.

7174. And they have the opportunity of learning that now, have they not?—Yes, to a limited extent.

7175. Have you had the examination of the engine-room artificers who have been entered for the service?—Occasionally I have attended the examinations of engine-room artificers.

7176. What sort of examination do you give them?—A practical examination principally.

7177. In what?—As to the names and uses of the different appliances of the engines and boilers.

7178. If a man comes from the private trade to enter the service as a coppersmith, do you ascertain whether he really is a coppersmith?—Yes, after entry.

7179. You put him to do a job of work?—Yes, after entry.

7180. And if a man wants to enter as a fitter, do you ascertain that he is what he professes to be?—If he enters from the dockyard we receive his certificate.

7181. But if he comes from the private trade you would put him to do a job of work in order to see whether he really was a fitter?—Yes, that is the practice. In the case of the engine-room artificers, that would be done under the officers of the steam reserve, where there is a steam reserve floating factory, after entry.

7182. You ascertain that they really know their trades?—Yes; they bring certificates from the places at which they have been employed.

7183. But do you examine them in order to find out whether they know their trades?—Yes, they are put to work to show that they can do what they profess to be able to do.

7184. Do you think that the men whom we have got as engine-room artificers, have been satisfactory as a rule?—I have not had them under me; they have been introduced into the service since I left active service afloat; but those men who have left the dockyard, and have passed into the service as engine-room artificers, have been good average workmen.

7185. Do you think that the pay which we offer is sufficient to induce good men to join?—No, it is not.

7186. What do you think would be sufficient?—I do not think that you will get good men under 6s. a-day.

7187. We want to enter young men between the ages of 21 and 25; do you think that we ought to offer them 6s. a-day?—I do not think that you could get them otherwise. We should get plenty of men to volunteer as engine-room artificers, but they are the class of men that we do not care much about retaining; if we had a young man who had been trained in the dockyard and turned out a good workman at 23 or 24 years of age, he could easily get work outside, and I think he would scarcely enter the service for less than 6s. a-day.

7188. Do you think that they take into consideration the other advantages that there are besides the pay?—As a rule, I do not think that those men consider them much; I do not think that they make up their minds to remain for any time, they only go for a voyage, as they consider it.

7189. They must enter for 10 years?—They do not look at it in that light; they do not look at any prospective advantage in the shape of pension, I think; perhaps some do, but the majority does not.

7190. Supposing we offered 5s. 6d. a-day on entry and an increase of 9d. a-day after three years' service,

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which would be almost immediately, do you think that good men would look upon that as a great inducement to enter?—They have 5s. a-day on entry now, and 5s. 9d. after three years.

7191. But I propose to begin with 5s. 6d. a-day, and to increase at the rate of 9d. a-day for every three years' service?—I think that might be an inducement for them to enter.

7192. What trades do you think we want chiefly in the navy as engine-room artificers?—Engine fitters, boilermakers, coppersmiths, and blacksmiths.

7193. What do you term a blacksmith?—Say an engine-smith.

7194. Are your smiths in the factory enginesmiths as a rule?—Several of them are.

7195. Is there any difference in the pay of a blacksmith and an enginesmith in the factory?—Enginesmiths get a higher rate of pay than blacksmiths.

7196. And they would be more useful to us, would they?—Yes, decidedly.

7197. A boilermaker is something of a smith, I suppose?—Some that we call angle ironsmiths. I must observe that the term "enginesmith" has been done away with in the dockyard, and they are called "smiths" now.

7198. That term is used with engine-room artificers; but does not it seem desirable to make a distinction when entering a man, in order to see that he has a knowledge of enginesmith's work more than of blacksmith's work?—I think that the enginesmith is the most desirable man to have, decidedly.

7199. Do you know from what class socially the engineer students are now taken?—I think that it varies very much.

7200. Is there any limit to the class, or may they be taken from anywhere?—I do not think there is any limit.

7201. Are the engineer students at Chatham chiefly from the neighbourhood of Chatham?—Yes; principally.

7202. And they live at home?—Yes, principally. We have some from the vicinity of Portsmouth, and even Devonport.

7203. Where do they live?—Generally in lodgings, with some of the workmen.

7204. Do you think it would be desirable to limit the class from which the engineer students were to be taken, or do you like the present system of open competition?—No, I do not like it.

7205. Would you rather see nomination by the Admiralty?—Yes.

7206. And competitive examination afterwards?—Yes, after nomination by the Admiralty.

7207. Do you think that would cause a better social class to enter?—Yes; I am quite sure it would.

7208. If that be desirable, are there any modifications in their treatment while in the dockyard which you would recommend. They now take up tickets, you know?—I think that some improvement might be made in that respect.

7209. Have they a place at Chatham for washing in and changing their dress?—No, not at present, but they will have shortly.

7210. Do you think that is desirable?—Very desirable, I think. I think that some difference should be made in their treatment from the time that they enter the dockyard, and that they should not be treated the same as the trade boys or workmen.

7211. If it be wished to get in a better class, you think that is a necessity?—Yes, I think so. By nomination in the first instance, I think you will in all probability get the sons of officers in the service to enter; now I think they are very nearly excluded, to begin with.

7212. Do you think that the examination for entry is a satisfactory one?—I think it is rather stiff.

7213. You would not make it higher?—No, certainly not; I do not think it is necessary to increase it.

7214. Are you aware whether the engineer students

are generally educated before they go into the dockyard?—I have no idea.

7215. Have you no idea that they have special preparatory schools for them?—Not at all, Chatham is not very well off in that respect at present, as regards schools.

7216. (*Captain Dowell.*) You say that all your engineer students come from Portsmouth, Devonport, or Chatham; do not you have any at all from other parts?—Sometimes they come from other places also, but they come principally from the vicinity of the ports.

7217. Do you enter many engine-room artificers?—No.

7218. They have to come through you, do not they?—I take part in their examination; they are entered by the steam reserve, and I take part in their examination, or my representative for the time being does.

7219. (*Captain Commerell.*) Do you consider that the present educational acquirements required of engineers are placed unnecessarily high?—I do.

7220. Do you consider that, being placed so high, it keeps out of the service a number of young men that it would be for the benefit of the service if we encouraged to enter?—I cannot say that I do.

7221. You think then that the article pupils in private factories could pass the higher examinations as they are?—I dare say that some few could, but I should prefer, as I said before, to lower the examination altogether. You might find many article pupils that would be able to pass it, still it is higher than is necessary in some respects.

7222. Do you consider that marks should be given for practical work, which is not the case at present?—Yes, I do for skill as mechanics; for instance, I think I have already stated that they should have more time for practical work. None of our students have reached the time when they will have to undergo a practical examination, but I was not aware that marks were not given.

7223. Which in your opinion is the better workman, a young engineer who has just entered the service, or the usual run of engine-room artificers. If you had a "ticklish" bit of work to do, which would you appoint to do it?—As a rule the engine-room artificers are the better workmen, but we have had some engineer students who have been very proficient as workmen. As a rule, a man who has been brought up to one particular class of work is better able to do it, as a matter of course, than a man who spends part of his time at each kind of work done in the dockyard.

7224. If serving afloat now, would you, from your experience of the engineer students, be prepared to give an assistant engineer, immediately on entry into the service, charge of a watch in an ordinary ship?—No, I would rather not do so.

7225. You do not consider therefore that when he enters the service he can be called a professed engineer?—Not for watch keeping, or to take charge of the engines and boilers of a ship.

7226. Do you think that he ought to be so?—Yes, I think so.

7227. Can you suggest a remedy for that?—Only by giving him experience in seeing engines under way. Practical experience in working the engines is the only way in which he can gain that experience.

7228. Are you satisfied with the present pay of the engineers?—No.

7229. If you were to increase their pay would you increase the pay of the young engineers, or would you increase the pay of those who had been for a long time in the service?—I should increase the pay of an engineer according to the number of years that he had served.

7230. At what age do you think it would be of benefit to the service that an engineer should be made a chief engineer?—I think that he ought to be made a chief engineer at somewhere about thirty years of age.

7231. (*The Chairman.*) At what age were you made a chief engineer?—I was a first engineer on the old scale at 25, but I must remark that I joined the service as a first engineer.

7232. (*Captain Commerell.*) In what year did you join?—On the 9th November, 1844. I passed the examination for first engineer on the old scale, but there was a regulation in those days that you could not obtain an appointment unless you had served for a certain time at sea, therefore, I went to sea as a second engineer for six months to be promoted when I had been for that time at sea.

7233. (*Captain Dowell.*) How much time do you count?—I suppose about thirty or thirty-one years.

7234. Do you count the whole of your time?—I had some time on half pay, about twelve months.

7235. You count all but the half-pay time?—Yes.

7236. (*Captain Commerell.*) A student on first entering the service as an assistant engineer receives 6s. a-day as such; he is then at the age of twenty-one; twenty-one years after, he is still an engineer, and is receiving pay at the rate of 10s. a-day; do you consider that relative rate of pay just and equitable?—No, certainly not.

7237. Do you consider that 6s. a-day for a young man on entering the service is sufficient, taking into consideration that he has received his education from the government for nothing?—Scarcely; I think it ought to be 7s. a-day.

7238. Amongst the engine-room artificers in the reserve, have you ever heard their causes of discontent, or has that ever come under your notice?—Not officially, but I have heard it talked about.

7239. Do you think that their grievances are, generally speaking, from what you have heard, valid grievances?—I think in some cases they are. I think that the kind of position in which they are placed on board ship, and the menial duties they have to perform, are such that you will not get any of the better class of artificers or mechanics to enter the service to submit to such things, or at any rate to care about remaining.

7240. (*The Chairman.*) To what menial duties do you refer?—Cleaning their messes, and that kind of thing.

7241. (*Captain Dowell.*) Why should not they do that?—They are not accustomed to that sort of work; they do not clean their messes at home in their own houses. The kind of men you should have in the service should be young men, who do not think of anything of that kind; it is no use having married men in the service; there are many things to make them discontented; they are placed in a position on board ship which is very irksome to men who have been brought up in the way they have been brought up. Of course a great deal depends, or all depends, upon the commander of the ship.

7242. Do you look upon them as a superior class of men to the chief petty officers, the chief gunner's mate, the chief boatswain's mate, and men of that highly respectable class?—I do not think that you can compare them at all to men of that class, as they have been brought up altogether differently.

7243. Socially would you call them better?—As a rule, socially they come from a somewhat better class; for instance, if you compare the two on shore, a chief boatswain's mate, although a very excellent and respectable man, and all that kind of thing, would drop into a different position altogether to that of a first class mechanic.

7244. (*Captain Commerell.*) Is it not a question between 3s. a-day and 8s. a-day?—No; I think that a first class mechanic is a man who has some pretensions to education, and springs from a different class to that from which the chief boatswain's mate comes.

7245. (*The Chairman.*) How about the chief gunner's mate?—The chief gunner's mate, in one direction, is no doubt a very respectable man, but in point of general education, I think you can scarcely compare the chief petty officers of the service

generally, to the mechanics of the service. I do not think that you give these mechanics of the service the position of chief petty officers now.

7246. (*Captain Dowell.*) In what position are they then?—They are petty officers of the lowest class, I think. (*The circular with reference to the rank to be held by engine-room artificers was shown to the witness*)—I see I am mistaken in that. At all events, you can easily understand that those men have not been brought up in the same way as a chief petty officer who has been brought up in the service. The engine-room artificers do not like things which the other chief petty officers do not mind at all; however, I think that something might be done to somewhat modify the kind of treatment to which they object.

7247. (*Captain Commerell.*) Should you have any objection to seeing an engine-room artificer (an ideal engine-room artificer) having charge of the stokehold of the ship of which you had charge?—No, not if I were satisfied that he was capable of taking charge of it.

7248. You think, therefore, that many men, whom we ought to get for fair and adequate wages, would be perfectly capable of taking charge of the stokehold?—Yes, I think so, under the direction of an engineer.

7249. (*The Chairman.*) Under the direction of the engineer in charge of the watch?—Yes, under the direction of the engineer in charge of the watch.

7250. (*Captain Commerell.*) In small ships you are aware that engine-room artificers are almost, as an invariable rule, in charge of the engine-room; that is, in vessels where they have only two engineers; are you aware of any difficulties having arisen in consequence of that?—No, I am not aware of any.

7251. Under those circumstances you consider that they might properly be left in charge of the engine-room of small ships?—Yes; I think so. You must recollect in small ships that the engineer in charge, if there be one or two, is almost next to the engine-room; he is close to it at any time.

7252. And always awake?—Yes, as far as he can be; but at any rate he is there to be called upon at any time that he may be required, although that condition would not obtain in a large ship.

7253. Have you ever thought anything about the pension of engine-room artificers?—No.

7254. You do not think that the prospect of pension has so much influence upon an engine-room artificer on entry as present pay?—I do not think it has. I think that they look more at the present rate of pay than to any prospective pension.

7255. Supposing that we were to reduce the list of engineers, and substitute engine-room artificers in their place—in case of war, when we should have to commission a very large number of ships, and also to purchase others for the service, from where should we be able to draw our engineers?—Then I think you would have to go to the private trade or to the mercantile marine.

7256. Do you think that the mercantile marine would come forward?—If you offered them sufficient inducement, I dare say a sufficient number would come forward.

7257. For temporary service?—Yes; because I imagine that in case of war a great deal of their occupation to a certain extent would be gone.

7258. (*The Chairman.*) In the case of some wars?—Yes; many lines of traffic would be shut up.

7259. (*Mr. Wright.*) Were you chief engineer of a large ship during the Crimean war?—I was chief engineer of the "Inflexible," a large paddle steamer.

7260. Had you any experience of the men who were entered as temporary engineers during that war?—No, I think all I had with me were men who belonged to the service at the time.

7261. Did you hear any complaints of the non-efficiency of the men who were entered temporarily as engineers during the Crimean war?—Yes, many.

7262. If you had to go to the country at large in

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order to enter a number of men on an emergency like that, do not you think that we should then be in the same difficulty?—War is a very exceptional state of affairs; and you would have some difficulty, no doubt, although I do not know that you could do better. I do not see any other source from which you could obtain engineers except from the mercantile marine or the private trade.

7263. Having in view the efficiency of the service, what is your view, generally, as to an improvement in the position of the engineers?—I think that the promotion to the rank of chief engineer is one of the first things to be looked to, and the next, the rate of pay of the engineers generally.

7264. (*The Chairman.*) Do you mean that it should be increased?—Yes, in proportion to their service. I speak now in the case of inspectors of machinery, chief engineers and engineers. I think that the engineers are the lowest paid class of officers in the service at present, taking them altogether, the superior and subordinate grades; if you begin at the beginning and take the highest class, you will find that there is a great anomaly about the pay of a chief inspector of machinery. There is no difference between his pay and that of an inspector; in fact, the title of chief is merely an honorary distinction, there is no emolument with it of any kind, although it certainly gives a little in the amount of pension to his widow; I believe that is the only pecuniary benefit derived by promotion from inspector to chief inspector of machinery. I think also that the pay of an inspector of machinery is much too low, because, under the present circumstances, a chief engineer in the service can receive more pay than an inspector of machinery.

7265. (*Mr. Wright.*) What do you propose that the pay should be?—I do not think that it should be less than 30s. a-day when promoted, and I think that the pay of a chief inspector of machinery ought to be £2 a-day on promotion.

7266. (*The Chairman.*) What pay do you receive in your present position?—My pay is made up this year to £573. I have made some few remarks upon paper, which, if you think proper, I will read to the Committee; they have reference to the subjects upon which we have been conversing: chief inspectors of machinery on promotion, £2 per day, and 1s. per day to be added for each year of service until the maximum is reached, which is £2 6s.; inspectors on promotion 30s. per day, 1s. per day to be added for each year served, until the maximum is reached, which should be £2; then chief engineers, under five years' service, 15s. a-day, 1s. a-day additional for each year served, until the maximum is reached, namely, 25s. per day; engineers under 5 years, 11s. a-day; engineers under 8 years, 12s. 6d. a-day; and engineers under 12 years, 14s. a-day.

7267. Do you recommend that the two classes of assistants should remain, or would you like to see one class abolished?—I do not see any necessity for the second class, and I would like to see it abolished. I have made a remark with reference to the classification, namely, that chief inspectors, inspectors of machinery, engineers, chief engineers, and assistant engineers would be sufficient.

7268. (*Captain Dowell.*) What should be the pay of an assistant engineer when he first joined the service?—7s. per day.

7269. 1s. increase on the pay now received?—Yes.

7270. In stating that, are you considering that he has received his education free?—Yes, I am: I think that a greater number of chief engineers should be appointed to ships; that is to say, I consider that all ships, for instance, commanded by a commander, should carry a chief engineer, irrespective of their horse-power. They have navigating lieutenants, and lieutenants and paymasters, and surgeons in those ships, therefore I do not see why they should not have chief engineers; by that means about forty more chief engineers than at present would be employed.

7271. All those ships have not those officers?—

Pretty nearly all; all commanded by commanders have those officers, and I do not see why they should not have a chief engineer. That regulation, with regard to the horse-power stands for nothing now, because vessels of 100 horse-power now have more power than those which were called 200 horse-power engines some years ago. I think the simplest plan would be to attach a chief engineer to each ship commanded by a commander, no matter what the power of the engines was.

7272. (*The Chairman.*) Your object is to expedite promotion?—Yes; that would afford a means of promoting more engineers, and then that taken in combination with the reduction in the number of engineers, their place being supplied by engine-room artificers, and altering the proportion of engineers and assistant engineers to chief engineers, would admit of a more rapid flow of promotion, or promotion to the rank of chief engineer at a more reasonable age.

7273. (*Mr. Covey.*) With regard to drawing engineers from the mercantile marine and the private trade during war, are you aware of the pay which we gave them during the Crimean war?—I think it went up to 15s. and 16s. a-day.

7274. Are you aware that they were paid more than the chief engineer of the ship in which they were serving?—Yes; I believe so.

7275. Would you like to do that again?—No; but as I say, war is an exceptional thing, and you cannot have a staff of trained engineers in the service on purpose for that emergency. I do not see from where you are to get them otherwise than from the mercantile marine or the private trade.

7276. Would you get over the difficulty of having to pay them as much as that?—You would have a larger supply to draw from now in the case of war, because, I suppose, the quantity of steam shipping has doubled, or more than doubled, since that time, and the regulations of the Board of Trade, and the certificates which they have to obtain, would ensure your getting a better class of men than you obtained during the time of the Crimean war.

7277. Do you think it is necessary to have copper-smiths amongst the engine-room artificers in a fleet?—Yes.

7278. How many would you recommend in a fleet like the Mediterranean?—I should think half a dozen would be quite sufficient.

7279. What trade of engine-room artificers would you recommend being entered into the service?—Boilermakers and fitters.

7280. Of which trade the larger number?—Boilermakers, because if you want to execute repairs to boilers when they become old, you will find that you want a considerable staff of boilermakers to effect those repairs in anything like a reasonable time.

7281. Do you think it would be better to "retire" engineers, or to "pension" them as at the present time?—I am rather inclined to think that it would be better to "retire" them.

7282. Do you think it would be better to increase the rank on retirement the same as with paymasters and many others; for instance, an engineer would retire as a chief engineer, or a chief engineer as an inspector of machinery?—I do not think that would be any good; it might be some good in helping them to obtain employment elsewhere, but I do not know that it would be any other advantage.

7283. (*The Chairman.*) Would you like to see the promotion from engineer to chief engineer, and from chief engineer to inspector of machinery, by selection or by seniority?—I am inclined to think that it would be better if made by selection.

7284. At all events a portion, if not entirely?—Yes, a portion; under the old system that was the case, and then it became the rule to make promotion by seniority.

7285. Do you think it is more desirable to give engineers charge pay in proportion to the size of the engines, or to give them higher pay irrespective of the ship to which they may be appointed?—I think

it would be better to give them higher pay; to appoint engineers of a certain standing as near as it could be done to ships of different classes, for which their pay would make them appear suitable on account of service and experience.

7286. Do you think that the system of giving charge pay as at present enables you to single out an active intelligent man for an important charge, and to reward him accordingly, an opportunity which you would not have in the other case?—No doubt it enables you to do that; that would be selection for appointment.

7287. Would your engineer students turn out work like that, and do you think it is satisfactory work (showing several specimens to the witness)?—I think that we have engineer students who could turn out work like that.

7288. (Captain Commerell.) By hand?—Yes, by hand.

7289. (The Chairman.) With their own hands, entirely unassisted?—Yes, with their own hands; it is pretty well done.

7290. (Captain Commerell.) Are you of opinion it was turned out by engineer students?—I do not know at all, but I do not see why it should not have been; there is nothing so very wonderful about it, it is not a particularly good job now; after five or six years training in the dockyard a young man ought to be able to do that if he pays attention to the training which he receives. Considering the number of duties and the various fittings of a ship, which are now placed under the charge of the engineers of a ship, is it not nearly time to consider whether the engineers should not be made executive officers?

7291. (The Chairman.) What do you mean by that?—Whether they should not belong to the executive branch.

7292. When you speak of "executive branch," do you mean "military branch"?—Yes, the military branch.

7293. You think that they should belong to the military branch instead of to the civil branch?—Yes, in the same way as the navigating officers.

7294. Are you aware that the term "military branch" simply refers to those officers who can have command of the ship, that is the only object of that branch?—I am; but without an engineer officer at all looking forward to anything like the command of the ship, the fact of his being recognised in the ship as an officer belonging to the military branch, as you describe it, would enable him to get many duties performed with alacrity and despatch that he cannot get performed now; and it would also give him a better position with regard to all the young officers in the ship. I think that if such a thing could possibly be put in practice, it would be advisable. I have myself gone about in a line-of-battle ship when it has been blowing a gale of wind, and could get nothing done except by getting hold of my own men and stokers. I have this further remark to make. I think it is necessary at the present time that the engineers should have a knowledge of the construction of gun carriages, guns and turrets, and all that appertain to them; and it is a question with me whether they should not go the little further that is necessary to have a knowledge of gunnery, and in fact to become gunners, if required in an emergency. I do not remember whether I have yet made the following remarks about the engine-room artificers; but I consider that they should, if possible, be obtained from workmen trained in or for sometime employed in the royal dockyards, as being more conversant with the service generally, with the duties required of them, and more accustomed to discipline. After a sufficient probationary term or period of service (say two years) they should be made chief petty officers. Previous to their being made chief petty officers their treatment on board ship should be somewhat in keeping with their social position as skilled mechanics, and arrangements should be made for relieving them of sundry menial offices which they now have to perform, and which the class of men of which engine-room artificers should be composed would never subject themselves to; their pay should be 5s. 6d. a-day on appointment, 6s. a-day after two years, and 7s. a-day after eight years' service.

W. Rands,
Esq., R.N.
18 Nov., 1875.

(The witness withdrew.)

[Adjourned to Tuesday, 23rd instant, at 12 o'clock.]

TUESDAY, 23RD NOVEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.
CAPTAIN WM. M. DOWELL, R.N., C.B.
CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.
JAMES WRIGHT, Esq.
WM. NATHANIEL COVEY, Esq., R.N.

G. FINLASON, Esq., Secretary.

CHARLES WILLIAM GEORGE CHAMBERS, Esq., R.N., called and examined.

7295. (The Chairman.) What rank do you now hold?—I am a chief engineer.

7296. In what year were you promoted?—This year (1875).

7297. In what ship did you last serve?—In the "Bellerophon."

7298. Were you the senior engineer of that ship?—Yes.

7299. How long were you in her?—Four years.

7300. What engineer staff had you in that ship?—Originally there were seven engineers, but lately only six in addition to the chief.

7301. And how many engine-room artificers?—Three, until a few months ago, when one was discharged from the service.

7302. Were those three engine-room artificers in the ship during the whole of the commission while you were in her?—No. Two joined when the ship was commissioned, the third some months afterwards, at Halifax, from H.M.S. "Sphinx." It was one of the former who was discharged.

7303. What trades were your engine-room artificers?—One a fitter, one a boilermaker, the other a coppersmith.

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7304. Were they competent men?—Yes; all of them.

7305. What trade was the one that was discharged?—A coppersmith.

7306. Why was he discharged?—He was objectionable on account of incompatibility of temper.

7307. He was in fact insubordinate?—Yes.

7308. Had you plenty of work for the boilermaker during the time of your commission?—Very little to do to the boilers.

7309. What other work did those men do when not employed at their own trades?—The boilermaker repaired tools, made various alterations and repairs in ladders, floor plates, and similar things; the others were employed in their own trades only.

7310. Were they good smiths?—The boilermaker was.

7311. Were they enginesmiths in any way?—The boilermaker was the only smith; the others could repair their own tools.

7312. Did you consider that three engine-room artificers was your complement?—No, two only.

7313. How long have you been in the service?—Very nearly 18 years; 18 years next month.

7314. What is your age?—38 next April.

7315. Were you promoted before your time, or did you obtain promotion by seniority?—By seniority. I had 12 months' time for a first class certificate.

7316. Do you consider that you were promoted under the average age at which men are now promoted?—Yes, I think so.

7317. What is your pay at this moment?—I am on the full pay of my late rank at present, 10s. a-day.

7318. What duty are you doing?—I am on leave under the late circular.

7319. How long will your leave last?—Until Christmas day.

7320. Upon what pay shall you go then?—The half-pay of a chief engineer, 6s. a-day.

7321. When you first entered the service in what time did you expect to be made a chief engineer?—I thought in about 10 years.

7322. Then promotion has become much slower since that time?—Yes, much.

7323. Do you think that the flow of promotion amongst the engineers is satisfactory?—I do not think it is.

7324. What could you suggest to improve it?—I can think of nothing at this moment.

7325. If there were a larger number of engineers promoted to the rank of chief engineers, and those men were put into smaller vessels than is at present the case, would not that tend to improve the flow of promotion?—Yes, I think it would.

7326. And if the elder engineers were allowed to retire at an earlier age, would not that tend to increase the flow of promotion?—Yes, I think so.

7327. If the engineers over 35 years of age were allowed to retire, do you think that many of them would avail themselves of the privilege?—I think so.

7328. Is there any other suggestion which you could make that you think would improve the position of the engineers at present?—I think that their messing might be better arranged.

7329. What would you suggest in that respect?—I would do away with the ranks of first and second assistants, and make them engineers and assistant engineers. The assistant engineers, on first joining the service, should go into the gun-room, and when they became engineers they should mess in the ward-room.

7330. Are you aware of the class from which the engineer students now entering are taken?—I am not.

7331. Do you know the regulations for the admission of engineer students into the service?—I do not.

7332. This list shows the occupation of the parents of the successful candidates for engineer studentships during the last three years (*handing the list to the witness*). Were you aware that a portion of them was

taken from those classes in society?—No, I was not. In fact, I never thought about it.

7333. Looking to the class from which a large number of these students are taken, there being no limit placed upon their social position; and, bearing in mind that those men live with their families for the six years that they are in the dockyard, do you think it is possible that many of those men, when they first join the service, could be put into the gun-room mess?—Yes, I think so, if they are to continue to be officers.

7334. You think that the sons of hairdressers, butchers, dockyard labourers, washerwomen, privates in the marines, and many others of a similar class could be put to mess with the officers in the gun-room mess without having received any previous training in their habits or ways, or, in fact, anything at all to fit them for it?—I think that if they could not be put there they ought not to be put in the position which they hold.

7335. But then they are in the position. Do you consider that they ought to be admitted to the position of officers?—I think so, if they are to take the responsibilities that they are supposed to take.

7336. Have the engineer messes in which you have been generally been decently regulated and well conducted?—Yes.

7337. Then, if these men are to continue officers, why not still remain in a mess which they can conduct decently and regulate well?—It is not that the mess is not comfortable, but rather that you feel yourself to be treated differently to other commissioned officers, through messing apart from them.

7338. Do not you think that a portion of those men ought not to be admitted into the gun-room, and if that be so where would you draw the line?—I think that is a difficult question to answer.

7339. Do you think it desirable that the engineer students should be admitted indiscriminately from any class in society?—If they are competent to pass the required examination, I should think so.

7340. You think then at the age of 14 or 15 that the only test necessary is the educational test?—And the question of conduct as well.

7341. We cannot know what their conduct is before we take them?—I can quite see the difficulty of the case.

7342. Would you rather see the engineer students who are to compete for entry selected by their lordships of the Admiralty when we might get them from a higher station in life, or would you still prefer to have them tested only by examination?—I think that it ought to be open to every one.

7343. Did the engine-room artificers in the "Bellerophon" keep watch in the stokehold?—Yes, they had charge of the stokehold.

7344. Do you know if any of them, during their service, received a certificate from the chief engineer, or from the captain, with regard to their qualifications in keeping watch in the engine-room?—They did not.

7345. Did those engine-room artificers in the "Bellerophon" work on board any other ships in the squadron at any time?—They have done so.

7346. And they received extra pay at that time, I suppose?—Yes.

7347. Are you aware whether in any of the small ships on the West Indian station the engine-room artificers kept watch in the engine-room?—Yes, in some of them.

7348. Do you know whether they performed their duty satisfactorily?—I believe so; I never heard to the contrary.

7349. Do you think that the pay which is given to engine-room artificers is a good scale of pay to keep them in the service?—I think a second increase of pay should be given them.

7350. You think that it is sufficient at first, but that an increase in their pay should be made before they have completed their 10 years?—Yes.

7351. You think that we then should have more

chance of keeping them in the service?—Yes, I think so.

7352. Did you observe when you were in the "Bellerophon" whether they had any special ground of complaint as to their treatment?—Their accommodation was wretched.

7353. Where did they mess?—Three of them had a small table, two-thirds of the size of that one (*pointing*), close to the fore mast, with the chain cable close at the back, and they had a small stool to sit upon.

7354. Did they mess by themselves?—Yes.

7355. Who cleaned their mess for them?—They had at first a boy put to mess with them for that purpose, but his duties prevented him from attending to the mess properly. A stoker messed with them afterwards.

7356. Did that make them more comfortable?—Yes; before they were always in trouble about their mess being dirty.

7357. Do you think that they were more satisfied at the end of two years than they were at the beginning, or that they had settled down more?—I do not think so; they frequently had to go without their meals for some time on account of the man who was supposed to attend upon them having to attend to his own duties, although he was excused as much as possible to wait upon them.

7358. In a ship like the "Bellerophon" where should you suggest that they should mess?—That is a very difficult question to answer; she was so crowded, there was no very comfortable place for them.

7359. Did any one mess on the engine-room flat?—No.

7360. Could they have messed there?—It was too hot.

7361. On what deck did the men mess in the "Bellerophon"?—The main deck.

7362. Was there any other deck than that where they could mess?—The only open space is on the funnel flat, but there they would have been in the way of the bag racks and other things.

7363. Did anyone mess there?—No.

7364. Could the stokers have messed there with any comfort?—There was no room; the bag racks took up most of the room.

7365. If better ventilation were given to the engine-room flat, scuttles were cut there, would not that do for them to mess in?—You could cut scuttles, but on the starboard side there is the workshop, a bag rack, and the steering wheel; on the port side there is a Downton pump, the turning gear for the engines, and a bag rack; so that there would not be room.

7366. In the neighbourhood of the turning gear for the engines, could they have messed if scuttles had been cut?—I do not think there would be any room.

7367. Then although their mess was uncomfortable, as you think, and no doubt it was, you do not see how it could be much improved in that ship?—No; excepting by their messing with the other chief petty officers. They did, I believe, originally mess with them, but on account of the man whom I mentioned being so disagreeable, the captain shifted them.

7368. You refer to the coppersmith?—Yes.

7369. Have you any suggestions to offer to the Committee as to the course of training which the engineer students of the present day receive. Do you think it is satisfactory, or are there any improvements in it which you would like to see made?—I think, if anything, that they are a little deficient in practical training. I only think that. I would not like to give it as my firm opinion, because I have not had sufficient experience of them to be able to speak positively.

7370. As a rule, if you had a job of work to do you would rather give it to an engine-room artificer than to a young engineer who had just joined the service?

—The engine-room artificer has had more practical experience.

7371. Do you think it is of importance, that when a young engineer first joins the service that he should be second in the engine-room, before he has charge of a watch in the engine-room?—I think that if he is in the stokehold he has sufficient training.

7372. But he should gain experience under an engineer before he is put in charge himself?—Yes, I think so.

7373. Do you think that the pay of engineers on first entering the service is satisfactory?—Yes, I think so.

7374. Would you recommend any alteration in their pay subsequent to their entry?—I think that the elder engineers ought to have a progressive rate of pay.

7375. Up to what should you suggest an engineer should go before being promoted to the rank of chief engineer?—I think to 12s. a-day.

7376. When did you pass for a chief engineer?—In 1865.

7377. What age were you then?—I was between 27 and 28.

7378. At what dockyard did you pass?—At Sheerness dockyard. I passed the theoretical examination in 1864 and the practical examination in 1865.

7379. What class did you take in 1864?—A first-class.

7380. For which you got a year's time?—I have only just received it. I have been promoted now 12 months before my time.

7381. Would you rather see engineers promoted to the rank of chief engineers by seniority solely, or in any way by selection?—By seniority only.

7382. If promoted by seniority only, you would not have been promoted for another year, would you?—No, I should not. But when I answered the last question I was thinking of the time gained by the first class certificate giving seniority.

7383. You think it is right that the class of certificate received should have an effect upon a man's promotion?—Yes, I think so.

7384. How long do you expect to remain upon half-pay?—I have no idea at all; some are on half-pay for 12 months.

7385. If you had your choice, what station would you choose for your next appointment. Have you any objection to the West Indies and North America station?—No; not if in the flag-ship.

7386. (*Captain Commerell.*) You say you consider that there would be no difficulty in bringing the junior engineers into the gun-room at once; at what age would you transfer them from the gun-room to the ward-room?—At about 23 or 24 years of age.

7387. How long have they been engineers then?—For three years.

7388. Would you take them straight from the gun-room, when they were made engineers, and put them into the ward-room?—Yes.

7389. Are you aware that the other officers, the assistant-paymasters and sub-lieutenants, still remain in the gun-room?—But their age is different.

7390. Do you consider, then, that everything must necessarily go by age?—No, I do not consider that at all; but age has a great deal to do with it, because as they get older, it becomes more irksome to be always living with youngsters.

7391. In fact, you would take them out of the gun-room as soon as you reasonably could, and put them into the ward-room?—Yes, I think so.

7392. Do you think that many of the young engineers, at present, would like to be taken from the engineers' mess and put straight into the gun-room?—I cannot answer that question.

7393. From talking to them, what have you been led to believe?—I have only met with two whose wishes in that respect I could speak about, and they, I think, would prefer to be in the gun-room.

7394. You do not consider that the present system of open competition brings a class of young men

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into the service, as engineer students, to whom it would be an unfortunate thing to transfer them into a mess with a social class with which they have not been accustomed to move?—I do not say that it is a good thing for dockyard labourers' sons to go there, but, considering the position in which the assistant-engineer is placed when he enters the service, I think he ought to go there.

7395. You mean that he ought to receive the advantages of the position in which he is placed?—Yes; I think so.

7396. Do you think it is a mistake or not to put him there?—I do not think it a mistake.

7397. Do you think then that open competition should remain entirely as it is, without modification?—I cannot answer that question, as I am not sufficiently acquainted with all the considerations which weigh in that competition.

7398. The fact is, that anybody whatever can put his name upon the Admiral Superintendent's list, that no sort of inquiry whatever is made as to his antecedents, and if he succeeds in passing a certain examination he has instantly provided for him an education which is worth £400 or £500, at the very least, and he is then transferred into the service as an engineer officer. Is that as it should be, do you think?—The only alteration that I can suggest is to raise the standard of examination, I should think very few labourer's sons can pass the present examination.

7399. Are you aware that by means of these board schools an education is open to everybody gratuitously, while, at the same time, a poor professional man cannot afford to educate his son in the same way that a boy can be educated at a board school?—That is a subject upon which I am not prepared to speak.

7400. Do you know that, or not?—I do not know that.

7401. Do you think that, the engine-room artificers generally, would be satisfied with a moderate progressive increase of pay, and an improvement in their messing arrangements?—Yes. I think so.

7402. Do you think that would insure our getting good men into the service?—Yes, the messing accommodation is a great grievance with them.

7403. From your experience of the engine-room artificers generally, do you think that they are much put upon on the lower deck?—Not unless a man be a disagreeable character.

7404. You think that when there is quarrelling there is generally fault upon both sides?—Yes, certainly.

7405. Do you think that it is on account of the engine-room artificer entering into the service at a later age, and as a skilled workman, that he is not prepared to meet the little necessities of the service as well as those men who have been brought up in it?—I think that they are not prepared to rough it so much as the other chief petty officers.

7406. From entering late in life into the service in fact?—Not exactly that, but on account of their different habits before.

7407. Would you in a small ship, if you were the chief engineer, hesitate to give the ordinary run of engine-room artificer charge of a watch in the engine-room?—I should want to look after him.

7408. Do you think that many of the engine-room artificers with whom you have been shipmates will re-engage after their 10 years shall have expired?—I think they would, if their accommodation were made better.

7409. Do you think that the pension has much value in their eyes?—Yes, I think so.

(The witness withdrew.)

JAMES PATERSON, Esq., R.N., called and examined.

J. Paterson,
Esq., R.N.

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7410. (The Chairman.) What position are you now holding?—I am chief engineer of Sheerness dockyard.

7411. For how long have you been there?—For three years.

7412. Where were you before that?—I was for 12 months assistant inspector of machinery at Chatham dockyard.

7413. What ship were you in last at sea?—In the "Agincourt."

7414. Have you any engineer students at Sheerness dockyard?—We have about 80.

7415. Do you examine them on the completion of their time?—Yes.

7416. Do you find them on examination to be fairly practical workmen?—Yes, very good workmen; they would not be what we should call first-class workmen; but they are very fair.

7417. Would you consider that the trade boys in the fitters' shops, at the end of six years, are better workmen than the engineer students?—They are, as workmen, a little better, but still they are both good workmen.

7418. Do you think that the regulations issued two years ago, placing them under the care of a leading man to watch over their practical instruction, have had a beneficial effect?—Yes, no doubt of it; he shows them how to do the work, and it answers very well.

7419. Is there any report made year by year, of the qualifications of the engineer students in practical manual work?—Yes. Half-yearly reports are forwarded showing their proficiency in practical studies.

7420. Is there any examination of them, excepting that at the completion of their time?—No, but I carefully inspect their work.

7421. Do you feel that you are limited in your means of instructing them, by being compelled to put them to work in the shops, which is of more advantage to the shops than to the engineer students?—No, there is no limit; we can put them to any work for which we may consider they are fit; we have them at lathe work and vice work, and in fact we can put them to any work in the shops.

7422. Do you consider that they earn their pay?—Yes, I think they do fairly. If you give them a piece of work to do they are more time than you would expect a good workman to be over it.

7423. You have had now some experience in the training of these engineer students in the dockyard, can you recommend any improvement in it?—No; I do not think that I could recommend any improvement.

7424. Do you think that their time for practical work and for schooling is fairly apportioned?—I do not think that I could suggest any thing to better it.

7425. Have you 40 engineer students at Sheerness dockyard?—I think there are 80.

7426. And one leading man to look after them?—Yes, one leading man.

7427. Has that leading man any other duty to perform?—No, no other duty.

7428. What is his pay?—8s. 6d. a-day.

7429. (Captain Dowell.) What sort of workman is he?—He is a leading man of fitters.

7430. (The Chairman.) Where was he brought up?—He has been at Sheerness dockyard for a very long time, but I do not know where he was before that.

7431. Do you think it would be an advantage equal to the increase of cost if there were three or four men

put in charge of the engineer students to watch over their practical work, bearing in mind the great importance to us in the navy of having the young engineers thoroughly qualified in manual work?—I think not. When in the fitting shop they have one man to look after the whole of them. On going into the moulder's shop they have the leading men of moulders to look after them; and when they go into the boiler shop they have the leading boilermaker to look after them. All the different leading men in the different shops look after them, and I do not think that there would be work enough for more men to look after them.

7432. Does the leading man who has special charge of them follow them into the different shops, the boiler shop, for instance?—They are there more directly under the foreman boilermaker, but the leading man who has special charge of them sees how they are getting on, and what they are doing.

7433. Is the foreman boilermaker or the foreman moulder paid anything for instructing those students?—No, nothing.

7434. Do you think that more attention would be given to the students if those men were paid something?—Yes, I think it would have that effect; they would take more interest in the students.

7435. Do you think that the foremen of the different shops pay more attention to the trade boys than to the engineer students?—No, I do not think so.

7436. It seems probable, you know?—I do not think that there is any difference made in that respect.

7437. When you examined the engineer students in their practical work on leaving the dockyard, do you give them certificates of one class only, or do you classify them in the way of saying that they are "very good," "good," or "indifferent"?—We classify them.

7438. In what terms?—"Very creditable," "credit-able," and "ordinary."

7439. That is for practical qualifications?—Yes, "very good," "good," or "fair" six monthly.

7440. Have you had any trouble with the engineer students in the way of getting them to attend to their work?—A little, but not much; one might, in fact, say none at all.

7441. In what particular point have you had any trouble?—I have had to find fault with them for inattention to their work, and occasional cases of carelessness.

7442. Are they pretty punctual as to time?—Yes, they keep very good time; they may be a day or two away perhaps without leave.

7443. If they are absent from the dockyard without leave, are they punished in the same way as the factory men?—No, they are admonished to behave better in future. If more than two days away they are brought up before the superintendent, this is very seldom.

7444. Do you stop their pay for those two days?—Yes; and if on leave their pay is stopped also.

7445. What other means have you of punishing them during their service?—We stop their next rise of pay until we think they are deserving of it. If we report them to the superintendent he will award that punishment.

7446. How long are they under instruction in drawing during their six years?—About four months, with the exception of the time during which they are at school at night. They are for four months in the day time, off their work, in the drawing office.

7447. Is that for months continuously?—Yes, from three to four months.

7448. During the whole of their fourth year they attend in the drawing office for a certain period?—Only for three or four months; not during the whole of their fourth year.

7449. Do the names of the candidates for engineer studentships come before you at all?—No, we never see them.

7450. Are you acquainted with the way in which the candidates for engineer studentships are selected?

—I believe they have only to make application to the superintendent and to fill up a form.

7451. Anybody can put his name down, in whatever class of life they may be?—Yes.

7452. Do you think that that is a satisfactory plan?—I do not think that it is a very satisfactory course.

7453. What would you suggest as an improvement?—I would suggest that there should be more care taken in the selection of them; that they should be nominated, in fact.

7454. Before they could go up for examination to pass?—Yes; inquiries should be made into their antecedents and as to how they have been brought up; I think that would be very advisable.

7455. If it were considered advisable or desirable to enter engineer students from a better class of society, are there any modifications in their treatment during their six years in the dockyard, that you would suggest?—No.

7456. At present, as the engineer students come from almost exactly the same class as the factory men, there is no difference made between them and the factory men; but if you wish to enter lads of a higher class, socially, would you not make some distinction or separation between them in the matter of such trifles, for instance, as not taking up tickets, not being searched by the police, having a place where they could go and wash themselves and change their dress, and such things as those. Do not you think it would be practicable to offer them such advantages as those?—They might have a place for washing and a little more care might be taken about their personal appearance, but I do not think it would be advisable for them not to take up tickets.

7457. If you made them sign a book the same as the signal men and others in the dockyard do, would not that answer the same purpose as taking up tickets?—Yes, that would answer the same purpose.

7458. What time do they leave off work at Sheerness dockyard in the summer time?—In the dockyard at six o'clock.

7459. What time have the students got to be in school?—At seven o'clock; we have a place for them to get their tea in and wash and dress themselves.

7460. Do they avail themselves of it?—A few of them do, but not a great number, the others go out and come in again as quickly as they can; they are in by seven o'clock, or a very little after.

7491. Do you examine the engine-room artificers who enter for the navy?—I used to do so with the inspector of machinery, when the steam reserve was at Sheerness, but now all that is done at Chatham.

7462. Have you not a steam reserve at Sheerness?—No.

7463. Do you enter any engine-room artificers at all at Sheerness?—No, they go to Chatham.

7464. During the time that they were entered at Sheerness, did any come from the dockyard?—Yes, a number came, some passed and others did not.

7465. When they entered from the private trade did you examine them as to their ability in the trade which they professed, or only as to the points specified in the regulations?—We examined them in accordance with the regulations.

7466. You considered that if they had been brought up to a trade that was sufficient?—They were tried in the floating factory afterwards.

7467. That was after they had been entered?—I think they gave them work to do before entry.

7468. You did not consider that the examination, as specified by the circular, included their work at their own trade?—I think that they ought to be examined as to their practical ability as workmen at their own trade.

7469. Did you by these regulations consider that you ought so to examine them?—We did not do it

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We left it to the inspector of machinery in the floating factory, as a rule, although I think we have done such a thing in a few instances.

7470. As a rule, do you think that we have got well qualified men as engine-room artificers?—Yes; but I think that there is room for improvement in them. We do not, I think, get the best men.

7471. For the best men we should have to pay very highly?—You would have to pay rather higher than is the case now.

7472. Do you know what we pay now?—Yes; 5s. on entry, and 5s. 9d. a-day after three years, which is the highest rate of pay.

7473. Do you think that if we wanted to get thoroughly satisfactory engine-room artificers in the service, in considerable numbers, we ought to give them more pay on entry, or progressive pay after they have been in the service some few years?—I think that we might increase their pay to 5s. 6d. a-day on entry, and increase 6d. per day every three years.

7474. Up to what maximum?—Up to about 7s. 6d. a-day.

7475. In speaking of that pay, do you bear in mind that they get paid for seven days a-week, get their provisions, pay when they are sick, certain employment for many years, and a pension at the end of 20 years' service?—Yes. The disadvantage is, that the men have to go to sea. They look upon that as a disadvantage, and consider that they must be well paid for it. I think myself that from 5s. 6d. to 7s. 6d. a-day would be a moderate scale.

7476. At what time would you give them that 7s. 6d. a-day, bearing in mind that they enter for 10 years, and at the end of that time you wish them to re-enter for another 10 years, while they have then got the prospect of pension closer to them?—I think that if they increased 6d. a-day after every three years it would be satisfactory.

7477. Have many blacksmiths entered at Sheerness dockyard as engine-room artificers?—Not many, but there have been some. I think that since I have been there about three or four blacksmiths have entered.

7478. Do you make a distinction in the dockyard between blacksmiths, as we term them, and enginesmiths?—We have no enginesmiths; the men have been taken from the dockyard smithery.

7479. Have not you any enginesmiths in the factory?—No.

7480. What pay do those men get?—The blacksmiths in the dockyard, I think, get 36s. or 38s. a-week. I forget what pay those particular men who entered had.

7481. Very much the same pay as an enginesmith gets, I suppose?—Yes, much about the same. Some go as high as over two guineas a-week.

7482. From your experience afloat do you think that the blacksmith whom we get from the dockyard would be as useful a man as an enginesmith?—I think not. An enginesmith I consider is always a better blacksmith than those men who have been brought up in the shipwright's smithery. An enginesmith's work is a finer class of work.

7483. Are the boilermakers generally decent smiths?—A number of them are very good smiths.

7484. Have you ever thought of the desirability of improving the promotion of the engineer class in the navy, or whether it is now satisfactory or unsatisfactory?—It is not very satisfactory at present, as the promotion is so slow.

7485. How many engineers had you in the "Agincourt," all told?—Seven engineers.

7486. Was that before the time of engine-room artificers?—No, we had three engine-room artificers.

7487. What is the indicated horse-power of the "Agincourt"?—6,800.

7488. Did you have three engine-room artificers during the whole commission?—Yes, I think so.

7489. In what year were you first chief engineer of the "Agincourt"?—In 1864 I joined her at Birkenhead; that was before she was finished,

7490. When she was in commission?—I do not think she was commissioned before 1867 or 1868.

7491. So far as you remember you had engine-room artificers almost immediately she was commissioned?—Yes.

7492. Do you think it is a necessity in a ship of the "Agincourt" class to have as many as seven engineers and three engine-room artificers, or could you work the ship satisfactorily with fewer engineers and more engine-room artificers?—No, I think we required them all.

7493. Have you had any experience of, or have you known of engine-room artificers keeping watch in the engine-room of small vessels at sea?—I have never had any experience of it.

7494. You have not noticed it in any ship coming into your hands in the Medway?—No, but they do so, I believe.

7495. Which would you consider to be the better man to conduct a job of work, a young engineer on first joining the service, or an engine-room artificer?—That would depend upon the sort of engine-room artificer it was.

7496. True, but take the average of those whom you have known entered?—I would, I think, rather depend upon the young engineer to do the work. I do not consider that the class of engine-room artificers which we have at present is composed of the best workmen, although some of them are very good.

7497. What standing was the junior engineer of the seven engineers that you had in the "Agincourt"?—There were two who had just joined the service; they had been students at Sheerness dockyard.

7498. Did you ever put them in charge of the engines?—Yes.

7499. Do you think that they were competent to take charge of the engines?—Yes.

7500. Where did they obtain their knowledge?—On board the "Agincourt"; they had been in a tug before for a little time, and they did very well.

7501. (*Mr. Covey.*) Was Mr. Hearson one of them?—No, he joined after I left. Mr. Coope was very good and so was Mr. Bills; they were both very attentive young men.

7502. (*The Chairman.*) Did you put them in charge because of the scarcity of men, or in order to learn their work?—They were in the stokehold, and engineers of more experience were in the engine-room.

7503. You had no young engineers ever in charge of the engine-room actually keeping watch?—No, not as a general rule.

7504. Why would you prefer an ordinary average young engineer, who has just completed his time, to an engine-room artificer, as part of the complement of the engine-room?—That would depend upon the experience of each of them. Supposing that I did not know what sort of man I was going to get, I should prefer a young engineer.

7505. Do the young engineers, before going to sea, learn to manage an engine at all?—Yes; they attend trials of ships, and take diagrams off yard engines.

7506. What gives you confidence in the engineer students knowing their work better than engine-room artificers, bearing in mind that the engine-room artificers are examined by the chief engineer of the dockyard as to their qualifications; is it the superior education which the engineer students receive?—Yes.

7507. You think that is valuable?—Yes; no doubt of it.

7508. And it makes them more reliable men?—Yes.

7509. Have you ever considered any good remedy for the stagnation of promotion in the engineer class just now?—I have not considered it much; but I think, perhaps, that if it were required, and we could get enough of good artificers, it might be advisable to adopt the same method of clearing the engineer list as was adopted in order to reduce the number of lieutenants and commanders; namely, by giving them an additional sum to induce them to retire. That would be a quick way of doing it. Another way would be to enter

fewer students, or gradually to reduce the engineers, and enter more engine-room artificers: that would be a work of time. Giving them additional retirement would be the quickest way of doing it.

7510. At what age do you think an engineer should be promoted to the rank of chief engineer, supposing you could so arrange it that men should not remain engineers beyond a certain age?—I think at about 33. Between 30 and 33 is the age at which they ought to be promoted.

7511. Do you think it would be advisable to put chief engineers in smaller ships than they are in at present, if it would tend to advantage the engineer class altogether in the way of causing quicker promotion?—I think it is very desirable that chief engineers should be in all ships commanded by a commander. If that rule were adopted, it would simplify matters, and there would be a great number given employment.

7512. And it would in itself expedite promotion?—Yes.

7513. Have you heard any reason given amongst the workmen in the factory for not entering as engine-room artificers?—No, no definite or special reason. They like to be with their families, and do not care about going away to sea, but I never heard them give any special reason for not accepting the position of an engine-room artificer.

7514. Do you remember where the engine-room artificers in the "Agincourt" messed?—They had a mess forward in the "Agincourt."

7515. On the mess deck?—Yes.

7516. By themselves?—Yes.

7517. Did you hear them complain about their mess at all?—Yes; they complained of having to scrub out their mess.

7518. Did those men in the "Agincourt" do their work satisfactorily?—Yes; there were two very good men, one was a good blacksmith and the other was a fitter; the third man was a sort of "nondescript," he knew a little of each sort of work.

7519. What had he been?—A stoker mechanic, I think.

7520. Was he a useful man?—Yes, he was both a useful and careful man, and he kept a very good watch.

7521. (*Captain Dowell.*) Have you ever thought at all whether it would be advisable to let the engine-room artificers have good conduct badges, with pay?—Yes, I think it would.

7522. Where did your engine-room artificers muster in the "Agincourt"?—They mustered at evening quarters by themselves.

7523. Where?—At the end of the line of men.

7524. By whom were they inspected?—By one of the engineers.

7525. Had any executive officer anything to do with them?—He mustered them to see that they were present.

7526. I mean for inspection at divisions?—One of the engineers mustered them, and then reported to the executive officer.

7527. To the commander?—Either to the lieutenant or to the commander.

7528. Who had charge of the division?—The lieutenant; they were in the lieutenant's division, although their bags and clothes were mustered by an engineer and reported to the lieutenant.

7529. As chief engineer of the ship you had nothing to do with the inspection?—I was responsible, but an engineer did that duty.

7530. Do you think it advisable that the stokers in the engine-room department should be in the lieutenant's division, and not solely under an engineer?—I think they should be solely under the chief engineer. The engineer is responsible for having the list of their clothes, and they are in his division as it were, although he has not a division of his own.

7531. Why should the lieutenant have anything to do with it?—I do not see why he should.

7532. Do you see any objection to an engineer

doing that duty?—I do not see any reason why he should not do it under the chief engineer.

7533. What is your opinion about the present pay of the engineer officers generally, beginning with that of an inspector of machinery?—I think that an inspector of machinery is very much underpaid.

7534. What pay do you think that an inspector of machinery ought to receive?—I think that they ought to have at least 30s. a-day when made inspector of machinery, and rise up to, say, £2 6s. a-day as chief inspector of machinery.

7535. After how many years' service?—Say, an increase of 1s. a-day upon 30s. a-day every year.

7536. Would you make any difference between inspectors and chief inspectors of machinery?—I would give a chief inspector of machinery £2 a-day rising up to £2 6s. a-day.

7537. What would you give a chief engineer?—They ought to commence at 15s. a-day on being made chief engineers and rise up to 25s. a-day.

7538. Have you any opinion to offer about the charge money paid to them?—Senior chief engineers will generally have 3s. a-day charge money.

7539. Do you think that is advisable?—Yes, I think so.

7540. What should engineers receive; they now have 9s. a-day and increase to 10s. a-day?—I think that they ought to go up as high as 14s. a-day.

7541. After how many years' service?—Say, rising 1s. a-day, from 9s. a-day, every three years.

7542. Have you thought about the pay of the assistant engineers?—I think that the assistants ought to commence at 7s. a-day.

7543. When they first come into the service?—Yes, I think so; they now have 6s. a-day.

7544. Do you take into consideration that they have been educated free of expense and have been paid during the time they are receiving that education, and that when they first go to sea they have very little experience, and you can hardly put them in charge of engines?—Of course, we take them all now from students.

7545. Do you think that an improvement ought to be made in that respect, or have you considered the matter; they have entered the dockyard as boys, and have been paid all the time they have been receiving their education, and when they have obtained that education you would give them at once more pay than you are now giving a sub-lieutenant?—I think that they ought to receive 7s. a-day.

7546. Do you think that the arrangement for the engineers' messing is satisfactory?—No, I think it is very unsatisfactory.

7547. What would you suggest as an improvement?—I would suggest that the assistant engineers should on entry mess in the gun-room, and that after five, or perhaps six, years in the service they should go into the ward-room.

7548. Then of course they would be engineers?—Yes; if the number of them be so much reduced you could do away with the engineers' mess berth. I think that the engine-room artificers ought to have a mess of their own; but I am regarding the engine-room artificers as a superior class to those which we have in the service now.

7549. What would you propose in the way of giving them a mess place?—They should have the same as that which the engineers have at present.

7550. What rank would you give them?—I would only give them the rank of first-class petty officers.

7551. Why would you give them so much better a mess place than that which the first-class petty officers have?—You could not get a good mechanic to go into a mess on the lower deck, and to scrub and clean his mess, and so on.

7552. But supposing that they are exempted from that scrubbing?—I do not know who would clean their mess.

7553. Who did in the "Agincourt"?—They scrubbed it out themselves.

7554. Did they object to doing that?—No; but

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I look upon the engine-room artificers of the future as a superior class to those men that I had with me in the "Agincourt."

7555. Do you think that we could get a superior class for from 5s. 6d. to 7s. 6d. a-day; from what social position do you think they would come?—I think that by giving that rate of pay they would come from a better social class, and they would also be better workmen. A good workman does not like to come into the service for such low pay as that given at present; it requires a larger amount to induce him to enter.

7556. The fact of a man being a good workman does not improve his social position, does it?—It does not follow, of course, but you will generally find that a good steady workman is a more respectable man.

7557. Have you anything to suggest to the Committee with regard to their uniform?—They should have a similar uniform to that of the first-class petty officers. I would give them a frock-coat, as I believe that the jacket is very objectionable.

7558. Do you think that a frock-coat would do at all for them in the engine-room?—No, not in the engine-room, they would wear a jacket there; they could put the frock-coat on when dressed on Sundays, or when on leave.

7559. Who managed their leave in the "Agincourt"?—They got it from the commander, after first going to the chief engineer to see whether he could spare them.

7560. Had they anything to do with the master-at-arms?—I think they told the master-at-arms; he always knew when they were going.

7561. Did they go to the commander?—Yes, from the chief engineer to the commander.

7562. Do you think that the retirement of engineers is satisfactory?—I think that it might be improved.

7563. A chief engineer at 55 years of age now retires upon £400 a-year, and the utmost that an engineer can retire on is £130 a-year; what would be your retirement now?—My retirement would be £420 a-year.

7564. After how many years' service?—After 28 years' service.

7565. Do you count all your time?—Yes; I entered as a second assistant.

7566. You do not lose anything?—I lose nothing whatever.

7567. Have you formed any opinion of your own as to what the retirement should be?—I think it should be on the scale of giving engineers 9d. a-day for each year served, and chief engineers 1s. a-day, but I have not studied the matter very much.

7568. (*Captain Commerell.*) Do you think that the engine-room artificers have any further complaints to make beyond those about their messing arrangements and want of progressive pay?—I do not know that the present engine-room artificers have any complaints to make.

7569. Would you, if you were chief engineer of a ship the size of the "Danae," have any objection to seeing one of the ordinary run of engine-room artificers, if you knew him, in charge of the engine-room?—No, I should not have any objection if he were a steady man.

7570. You think that taking the engine-room artificers as a body, although they are not, perhaps, the best workmen we could get, they are at all times very fair for their class?—Yes, very fair for their class, and I daresay they keep watch very well.

7571. Is it within your knowledge that many armourers and blacksmiths in the service have passed for engine-room artificers?—It has not come within my knowledge, but I believe there have been some. At first, when the grade of engine-room artificer was established, a handy man, as it were, not a good workman, was made an engine-room artificer.

7572. You do not think that is a good thing?—No, I do not.

7573. You think that we ought to have fitters or boilermakers, who have learned from their early youth one profession?—Yes.

7574. In fact a man who could do a larger job of work than a handy man could undertake?—Yes. I think he ought to be a thoroughly qualified workman, who had served a proper apprenticeship to the trade he professed.

7575. Do not you think that by attempting to put engine-room artificers into the engineers' mess, which in some ships is a very superior description of mess, you would be removing them too far from that which we require them to be, namely, working artificers?—No, I think not.

7576. Do not you think that a mess place, like that which the master-at-arms and the chief petty officers have, partially covered in, would be sufficiently good for the engine-room artificers?—It would be just as well to make a mess place for them, because if engine-room artificers are to be substituted for engineers, you would require a large mess berth; just as large as the engineers have at present.

7577. But a large mess berth, like that which you describe, entails servants?—Yes, there would have to be a servant and cook; you could not have those men preparing their own dinners.

7578. A servant and a cook?—I think so, or the ship's cook might do; but you could not have those men preparing their dinners, as the artificers do at present.

7579. It is an extravagant way of using skilled labour?—You could not get skilled labour unless you gave those men a comfortable place to be in; you would only get very indifferent men; good mechanics would not put up with a common mess place.

7580. You do not think that they should become warrant officers?—I think not.

7581. Do you think that the prospect of pension or the present rate of pay is the greater inducement for an engine-room artificer to remain in the service?—I think that the prospect of pension is the greatest inducement.

7582. That would, after ten years, induce them to remain when they would otherwise go?—I daresay half of them would go.

7583. Would you like to see our engine-room artificers educated in our own dockyards, taken from the trade boys, or would you rather have the position thrown open to the private trade and large factories, such as Maudslay's, Penn's, and so on?—I think it should be both. The trade boys that are brought up in our factories would make very good engine-room artificers.

7584. In case of war, where do you think we should have to look for our reserve of engineers for the purpose of officering our ships?—I think that we should have to look to the private firms outside for our engineers.

7585. Do you mean to enter them temporarily?—Yes.

7586. For special service?—Yes; I have no doubt a number would join from the artificers or workmen of the dockyards.

7587. As engine-room artificers?—Yes, as engine-room artificers.

7588. Would you, after the necessity for their retention ceased, continue them in the service or discharge them?—If required, I would continue them in the service, but if they were not required, I would discharge them, if they were only engaged for temporary service.

7589. You would give them a large present pay, but no pension?—No, not any pension.

7590. Do you think that the general wish in the service is that the engineers' mess should be done away with?—It is the universal wish of the service. I think that the engineers' mess is a great cause of dissatisfaction, as the engineers are not looked upon as officers.

7591. Do not you think that is very often more a fancy than a reality?—I think not. I think that only

the gun and ward-room messes are looked upon as containing officers. What the engineers complain of is, that they are not acknowledged as officers.

7592. How do you account for that?—Through their being isolated and placed in a mess of their own; they do not associate, or are not allowed to associate, with the other officers of the ship.

7593. Have you in many ships which you have served, seen cases where the engineers have not been allowed to associate with the other officers?—There are cases in which they do not, I believe. I think that the engineers are quite fit to associate with the officers of the gun and ward-room messes, as they are

educated quite as well, if not better, than those officers, although there is no fault to be found with the education of the officers in the gun and ward-room messes; there may be amongst the engineers some men who are not altogether what one would wish, but if they did not conduct themselves properly they would be very soon weeded out.

7594. (*Mr. Covey.*) You spoke about the engineer students losing time; do not they have to make up the time which they lose?—Yes, they have to make up the time which they lose.

7595. Do not they consider it a great punishment?—It is a punishment, but not severe.

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(*The witness withdrew.*)

[Adjourned to to-morrow at 12 o'clock.]

WEDNESDAY, 24TH NOVEMBER, 1875.

PRESENT :

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WILLIAM M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERCILL, R.N., K.C.B., *W.C.*

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

WILLIAM MACAULAY, Esq., called and examined.

7596. (*The Chairman.*) What position do you hold at present?—I am one of the managers of the Peninsular and Oriental Steam Navigation Company.

7597. Have you anything special to do with the engineer department of your company?—I have a general supervision of every department.

7598. The Committee are anxious to know if you can give them the information what steps are taken by the Peninsular and Oriental Company for providing themselves with engineers, and the Committee would also wish to know the complement of engineers in each ship, the duties which they perform in each ship, and the pay and prospects that they have in your service. Will you be kind enough, if possible, to give us that information as shortly as you can?—I will.

7599. First then will you inform us whence you get your engineers?—As a rule we generally have a large list of applicants. We never take any senior engineers, we begin with juniors. We take them all in as juniors, and then they work up in the service. We promote from 5th engineer to 4th engineer, and so on, to 1st engineer, but we never take in an engineer except as a junior.

7600. Your engineers are in five classes, are they not?—We have six classes.

7601. From where do the applicants generally come?—Three-fourths of the engineers in our service are, I should say, Scotchmen. They come from the Clyde, and from other shipbuilding ports in Scotland.

7602. From engineering works?—Yes; from engineering works where they make marine engines.

7603. From marine engine factories?—Yes.

7604. Can you tell me what number of engineers you have in your service altogether?—We have got 49 chief engineers on the list at present, 42 second engineers, 46 third engineers, 42 fourth

engineers, and 42 fifth engineers, 26 boilermakers, and 18 winchmen, who have been firemen.

7605. Do the boilermakers and winchmen rise to be engineers?—A boilermaker never does.

7606. (*Captain Commerell.*) But the winchmen do?—They are not practical engineers; sometimes they are boilermakers. They have to do with the steam winches on deck.

7607. (*The Chairman.*) Are the winchmen generally enginesmiths?—Not always; they are sometimes boilermakers, but not necessarily so.

7608. Have all those men served their time at a trade?—Yes, all except the winchmen. I do not say that they have, but all our engineers have.

7609. And boilermakers?—Yes, and boilermakers. All the boilermakers have served their time as such.

7610. Are all these men you have mentioned on pay now?—Yes, all on pay.

7611. You have not included the applicants?—No, those I have mentioned are simply the men who are actually afloat at the present time.

7612. What pay do your men get on first entry?—We pay our winchmen £72 per annum, boilermakers £132 per annum, and after three years £138 per annum; we pay the fifth and sixth engineers the same, viz., £120 per annum, fourth engineers £138 per annum, third engineers £150 per annum, second engineers £180 per annum, and chief engineers £250 per annum, and after three years £275 per annum, after seven years £300 per annum, and after ten years £350 per annum.

7613. Have they any gratuity or pension upon retirement?—We take each individual case separately into consideration, and it depends upon its merits. Where a man has been an old and valued servant we might either give a small pension or a sum of money.

7614. Which is the more usual?—We generally

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W. Macanlay, Esq. give them a sum of money. We have very few on the pension list.

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7616. (*The Chairman.*) As a rule have all those men served upwards, from the lowest grade?—Yes, all of them.

7617. On what terms are they engaged?—Formerly, before the opening of the Suez Canal, we used to engage them all for three years, the conditions of which engagement, I cannot tell you, because I have not got them with me. It is rather a long document, but if you wish it I can send a copy to you. We do not use those conditions now, except for such engineers as are employed on the Australian line, or on one or two local Indian lines. Now, our engineers are simply on the ship's articles for six months.

7618. If it is wished on either side to break the agreement it can be done?—Then they are obliged to give us six months' notice, or we are obliged to give them three months' notice, but we have the power of dismissing them for misconduct, drunkenness, breach of discipline, or anything of that sort, immediately, without giving them warning first.

7619. On entry your engineers receive £120 a-year?—As fifth and sixth engineers, yes.

7620. In addition to that salary, do you provide them with their provisions, mess, and food entirely?—Yes.

7621. Do they wear a uniform at all?—Yes.

7622. Do the boilermakers wear a uniform?—No, neither the boilermakers nor the winchmen wear a uniform, but the engineers do.

7623. When they apply for admission, how are they examined?—They are examined by our superintending engineer.

7624. Where at?—In London now, formerly it was at Southampton. We had no superintending engineer here until we transferred our fleet to London; at one time, Southampton was our engineering headquarters and principal dépôt in England.

7625. Where are your head-quarters now; do your ships come right up to London?—They come to the Victoria Docks always.

7626. Have you any printed regulations as to the qualifications you require engineers to possess on entry?—No; we have printed no regulations as to qualifications, but we call upon them to produce their certificate of character and qualifications from the place where they last served before we take them, and then they are examined generally as to their abilities by our superintending engineer.

7627. That is in practical work?—Yes.

7628. What educational requirements have you, or have you any?—We do not call upon them for any special educational qualifications outside of their profession.

7629. You require them to have a knowledge of reading and writing, I suppose?—Yes, of course, and as a rule most of them are very good draughtsmen. We give the preference to young men who have those qualifications, and they are most likely to rise in our service.

7630. How are they promoted?—According to seniority and merit combined. We do not promote a man merely because he is next senior; if there be one below whom we consider to be a better qualified man, we should promote him in preference.

7631. How long are they from the time of entry before they reach the rank of chief engineer generally?—Sometimes a long while: promotion is very uncertain in our service; occasionally it is very rapid, and at other times it is rather stagnant.

7632. You had a few years ago a printed list of the officers in the company's service, have you that list now?—Not with me.

7633. Does that list include the engineers?—Yes.

7634. Could you give the Committee any idea of the average number of years they are in your service, or of their average ages?—I can tell you the exact ages, the oldest chief engineer in the service is 67, and the youngest is 35 years of age.

7635. Is that about the youngest age at which a man is able to be promoted to the rank of chief engineer in your service?—Oh no, we have had younger men promoted to that rank, but that appears to be the youngest case at the present time, and we now very seldom have a chief engineer under 30; second engineers, the oldest is 54, and the youngest 26; third engineers, the oldest is 62 (so that you see they do not always get promoted according to age), and the youngest is 24; fourth engineers, the oldest is 33, and the youngest is 24; fifth engineers, the oldest is 33, and the youngest is 22. Boilermakers, the oldest is 45, and the youngest is 24.

7636. I think you said that you had six classes of engineers, exclusive of boilermakers and winchmen?—Yes, but we pay the fifth class the same as the sixth class.

7637. Have you any other artificers attached to the engine-room department besides the boiler-maker and engineers?—No.

7638. You look for them amongst your engineers entirely?—Yes, we ship boilermakers for a separate class.

7639. You have not what we call artificer-fitters or engine-smiths?—No, the engineers do all that work, they do everything in fact connected with the machinery.

7640. (*Captain Commerell.*) In fact you have no artificers?—None, what you in the navy call artificers, except the boilermakers.

7641. (*The Chairman.*) How long do your boilermakers generally remain in your service?—For a very long time, some of them for many years. I dare say this man that I spoke of, who is 45 years of age, may have been in our service for 15 or 16 years.

7642. Do you lose any earlier, or do they ever leave you soon after they enter?—No, I do not think so, not the boilermakers.

7643. Do you give them employment on shore at all, or are these men always kept on pay?—Not in this country, they are always kept afloat in ships so far as this list is concerned; we have other boilermakers and engineers employed in our factories in the East.

7644. Are any of your seagoing men employed in your factories in the East?—Yes, if a man be sick we take him away from the ship and put him on shore in the factory. I gave you the list of the actual men afloat.

7645. What is the indicated horse-power of your largest ship?—The "Khedive" is 3742 tons gross register, 600 horse-power nominal, and 2695 actual.

7646. What number of engineers has she?—She has got five engineers and a boilermaker.

7647. Five engineers including the chief?—Yes.

7648. How many watches are those men in at sea?—We do not call upon the chief engineer to keep any special watch, he is the only officer that you would in the navy call a quarter-deck officer; he is the only man who is entitled to go into the saloon for his meals, and to appear on the quarter-deck; the others are only allowed to go there at the invitation of the Captain; the watches are divided into four hours each; from 4 to 8 is the second engineer's watch. We have no European firemen in our ships.

7649. None?—None at all, we draw all our firemen and coal trimmers from the natives of India and Africa.

7650. (*Captain Dowell.*) What are termed Seedy boys?—Yes.

7651. (*The Chairman.*) Have you no English leading men amongst them?—None whatever; the second engineer keeps the 4 to 8 watch with a Serang, and the third engineer and boilermaker keep the watch from 8 to 12.

7652. Does the boilermaker do duty in the stokehold?—He repairs the boilers, and is generally made useful in connection with the working of the machinery.

7653. That is to say that he assists the engineer in charge of the engines and boilers?—Yes.

7654. How about the third engineer?—He may be in any watch, but that is the way in which we put it as a rule, the 12 to 4 watch is kept by the fourth and fifth engineers.

7655. And the 4 to 8 watch in the morning?—That is kept by the second engineer.

7656. So that in fact the engineers are in three watches?—Yes.

7657. How many boilermakers has that ship, the "Khedive"?—One boilermaker.

7658. What kind of engine-room register or log is kept?—Each engineer on the watch keeps his own log-slate, and the chief engineer is responsible for the log generally; each engineer records any circumstances in his watch which may happen.

7659. Where do the boilermakers mess?—As a rule, we have a separate mess for the engineers, and the boilermaker messes in the junior engineers' mess.

7660. Is that mess provided entirely by the company for both the engineers and the boilermakers?—Yes.

7661. (*Captain Dowell.*) Is that the case also with the winchmen?—Yes; every body on board is provisioned by the company.

7662. (*The Chairman.*) I suppose as a rule there are not many repairs done on board?—Yes, a great deal; when our ships are in port, we expect our engineers to do the bulk of the repairs.

7663. On arrival at home?—Yes, or wherever the ship may be.

7664. When you want large repairs done to the engines, what do you do?—Then we employ the Thames Iron Works Company.

7665. You employ them entirely for your work?—Yes, entirely.

7666. Who looks after the engineers' mess on board ship?—The whole of the provisioning department of the ship is in charge of the purser.

7667. I mean looking after it, in order to see that it is kept clean ordinarily?—The chief engineer is supposed to see that his people keep their mess-room in order, but it is not laid down as one of his duties; the captain sees to that.

7668. I suppose the chief engineer is entirely under the control of the captain?—Yes, entirely.

7669. Has the second officer of the ship, the chief officer of the ship, anything to do with the cleanliness of the engine-room?—Nothing whatever; the chief engineer is solely responsible for the cleanliness of his engine-room in every respect.

7670. Is there any special engineer generally appointed to look after the cocks and valves in the ship?—We hold the chief engineer responsible for everything of that kind.

7671. And he may appoint for that duty whomsoever he pleases?—The engineer of each watch is responsible under the chief engineer, for all the cocks, and valves, and sluices, and things of that sort.

7672. I presume that all the auxiliary engines are under the chief engineer as well; the winches, and so on?—Yes; we hold him responsible for keeping all in good condition.

7673. Have you any steam capstans in any of your ships, steam for weighing anchor and steam gear generally?—Yes; we have steam steering gear in

some of our ships, but not all, and we have steam capstans in nearly all of them. W. Macaulay,
Esq.

7674. Have you given up the hydraulic gear?—We never tried it but once, and it then proved a failure. 24 Nov., 1875.

7675. In what ship was that?—The "Mooltan," 20 years ago.

7676. Who chiefly makes your engines now?—We have contracted with various people for making our engines; generally for the ships built in the Clyde, the builder of the ship makes them.

7677. Did not Messrs. Napier make all your paddle engines?—We have never been confined to any one maker.

7678. (*Captain Dowell.*) Do your engineers get the same pay whether they are in harbour or at sea?—Yes, the same.

7679. Do they have any allowances in the same manner?—Yes; they mess in the same manner.

7680. The mess is always kept going?—Yes.

7681. As a rule do you think that a young engineer on entering the service has a fair prospect of being made a chief engineer?—Yes, if he behaves himself, remains in the service, and is intelligent.

7682. Do you make them pass an examination?—Not a formal examination; we simply hand them over to the superintending engineer, who asks them such practical questions as he thinks proper, and if he is satisfied with them, they are allowed to enter.

7683. Practically you do examine them?—Yes, in that manner, but there is no set examination.

7684. If he were not satisfied with them, he would say they could not enter?—Clearly he would.

7685. Have you any of the engineers besides the chief, got cabins?—The second engineer has a cabin to himself.

7686. Is he allowed a servant?—No, he is not; we allow one servant to the engineers' mess.

7687. (*Captain Commerell.*) And a cook, I suppose?—Not a separate cook; the cooking is done in the ship's galley.

7688. (*Captain Dowell.*) The saloon cook cooks for them?—Yes; they have just the same mess as we give to the second class passengers.

7689. (*Captain Commerell.*) Has the chief engineer any perquisites or allowances?—No, none.

7690. Has he any charge-money?—I do not understand the term "charge-money."

7691. In the navy, a chief engineer, according to the size of the engines of which he is in charge, has so much a-day allowed to him?—Our chief engineers have nothing besides their pay, which is graduated according to the time they have been in the service; we pay them the same everywhere, in India and everywhere else.

7692. (*Captain Commerell.*) On the China line they do not come home; those who run between Bombay and China?—During the tea season we bring home all the ships from China straight to London, with the mails via Galle.

7693. (*The Chairman.*) Have you any appointments either at home or abroad to which your chief engineers are appointed after long service?—We have three appointments, four or five I may say, in fact we have a superintending engineer here, and there is another one in Bombay, and another one in China; then there is an assistant superintending engineer here, and one also in Bombay.

7694. About what salaries do they get?—£700 a-year is what we pay our superintending engineer here; we pay them higher in India.

7695. Are your chief engineers generally selected for those appointments?—Yes; they have all been chief engineers in our service.

7696. (*Captain Commerell.*) According to what you say, your engineers have no special theoretical education that you know of?—I fancy most of them have; most of the Scotch engineers are very well educated men in their profession, but their education has been more a practical than a theoretical one.

W. Macaulay, Esq.
24 Nov., 1875. 7697. Which would you sooner have them possess, a good practical or a good theoretical education?—We would not take a man who did not understand practically what he might be called upon to do.

7698. Supposing a man had been educated for six years in a factory where he had never had the slightest practical education in working the steam engine, would you take him?—No, certainly not.

7699. (*Captain Dowell.*) Not if he were competent to erect an engine?—We take our juniors from the factories, but then we do not place the juniors, except as fifth or sixth engineers.

7700. (*Captain Commerell.*) Would you take on board one of your ships an engineer 21 years of age who had never driven a marine engine?—All these men we take have driven marine engines; they have seen them in the factories, and they have been fitted up before being put into the ship.

7701. Supposing that a young engineer was put on board one of your ships, and he had never driven a marine engine, what then?—We should not give him charge of a watch.

7702. Would you take him?—We should take him if he had a practical knowledge of the marine steam engine; there is no difficulty in seeing that the parts are working properly.

7703. (*Mr. Covey.*) If he had served his time in a factory, you would take him?—Yes; certainly, if he had served his time in a factory.

7704. (*Captain Commerell.*) You would put him in charge of a watch, and trust that in a few months he would have gained that knowledge which was requisite?—Not in charge of a watch; if he had a practical knowledge of how to make an engine, and had assisted in putting an engine together, we should take him as sixth engineer.

7705. Is the examination which the superintending engineer gives them a crucial one?—It is not what you would call in the navy a crucial examination.

7706. It goes more by character than anything else?—According to the certificates which a man brings from the people by whom he has been employed.

7707. If you find that he is not a likely young man, you can get rid of him easily?—Yes; we can get rid of him in six months at any time, but I do not know of any young man that we have had to get rid of for incompetency.

7708. (*Mr. Wright.*) I think you said that you had plenty of applications?—Yes.

7709. Do you sometimes get engineers from the factories in which the engines are made?—Yes; sometimes.

7710. They are young men, I suppose?—Yes, generally. I may tell you that we carry in the

“Khedive” six Europeans, and forty-three natives; they are divided as I have already stated, namely, five engineers and a boilermaker, who are Europeans, one Serang, two Tindels, three Paniwallahs, one native storekeeper, one lamp man, eighteen firemen, one Bandarry, who is cook for the natives, one engineers’ servant, who is a native of India or a Portuguese generally, one trimmer Serang, and fourteen trimmers, that constitutes the engine-room crew of the “Khedive.”

7711. (*The Chairman.*) What is their pay?—Their pay ranges from £3 13s., down to £1 5s. per month.

7712. Have you any trouble as to their caste?—They have no caste, they say they have, but it is not recognised.

7713. Have you any further remarks to make to the Committee, or suggestions to offer?—Here is a book which contains our instructions to our engineers, which I shall be very glad to leave with you, it will show you exactly what our instructions are for the chief engineers, both as to their duties and the general working of the department (*handing the same to the Chairman*).

7714. (*Captain Commerell.*) What do you think is the average age of an engineer on becoming a chief engineer, taking one with another?—About from 30 to 35 years of age you might say.

7715. (*The Chairman.*) Have you any fixed age at which you think a chief engineer must leave your service?—No; it depends upon the individual entirely, one man at 65 may be quite as strong as another man at 50.

7716. (*Captain Dowell.*) Practically 65 is about your limit?—Yes; or you might say 60, although we have one in our service, as I said, 67 years of age.

7717. Do all your ships come up to Calcutta, or would you send the “Khedive” there?—Yes.

7718. (*Mr. Covey.*) What proportion of deaths have you amongst your engineers, can you tell at all?—I could not tell without referring to the books, but it is not great I know.

7719. Are all your ships built in compartments?—Yes.

7719*. Have the engineers anything to do with them?—Yes; they are entirely under the chief engineer, and he is responsible to the captain for the whole of them; we hold the chief officer and the chief engineer responsible for all the cocks, pipes, valves, sluices, and so on, and we require the captain and chief officer to satisfy themselves frequently that they are in order, and not to merely take the word of the engineer, the captain and chief officer have to satisfy themselves that those parts are in proper order.

(*The witness withdrew.*)

[Adjourned to the 16th December, at 12 o'clock.]

THURSDAY, 16TH DECEMBER, 1875.

PRESENT:

VICE-ADMIRAL SIR A. COOPER KEY, K.C.B., F.R.S., in the Chair.

CAPTAIN WM. M. DOWELL, R.N., C.B.

CAPTAIN SIR JOHN E. COMMERELL, R.N., K.C.B., &c.

JAMES WRIGHT, Esq.

WILLIAM NATHANIEL COVEY, Esq., R.N.

G. FINLAISON, Esq., Secretary.

JOHN BOWERS, Esq., called and examined.

7720. (*The Chairman.*) What position do you hold now?—I am superintending engineer for the Royal Mail Steam Packet Company at Southampton.

7721. Have you served at sea as an engineer?—I have.

7722. In the Royal Mail Company is it the rule to enter the engineers young, and let them serve up in the service, and be promoted?—Yes.

7723. Invariably?—Yes, invariably.

7724. At what age do you get them?—At 24 or 25 years of age.

7725. From where do you get them?—We have an establishment which is specially managed by myself, and which is called the factory establishment; any applications for appointments in that factory, I answer; whether they come from England, Ireland, Scotland, or wherever it may be, and when we require to put any hands on in the factory I send for as many of those young men who have made applications as we require to fill the vacancies.

7726. You mean men who have served their time?—Yes.

7727. Do you take any as boys?—A very limited number, we bring up ourselves.

7728. Who are apprenticed to you?—Yes, in our factory.

7729. Do those boys afterwards become engineers?—Yes; one of them is manager for Sir John Rennie, Mr. Phillips, he was a boy brought up in our factory, others have risen to be chief engineers in our service. They generally hold good positions; they are a better class of boys as a rule.

7730. With regard to these young men that you obtain from different firms, at what trade have they generally served their time?—At engineering.

7731. As what?—As fitters; they have gone through the different shops. We prefer a man who has had probably two years' pattern making and two years' fitting, and probably the last year erecting.

7732. Have you a special grade of boiler-makers in your ships afloat?—Yes.

7733. How many in each ship?—One.

7734. Does he rank with an engineer?—Yes; but under the engineers; he messes with the junior engineers.

7735. Does he keep watch as an engineer?—He keeps watch with one of the engineers, but he is always told off to attend to the boilers.

7736. To what does he rise?—He does not rise at all, he always remains a boiler-maker as when first entered; he can never rise beyond that.

7737. Can you tell the Committee what grades of engineers you have in your service?—A chief engineer, a second, third, fourth, fifth, sixth, and a boiler-maker.

7738. What is their respective pay?—A chief engineer £22 a-month, and inter-colonial £24 a-month; we give them conditional money; probably I had better enter into a little detail. The chief engineers who trade to and from Southampton would only receive £22 a-month, but that is very rare; as a rule, when we promote a man, we send him to relieve one in the inter-colonial service, so that practically he would get £24 a-month,

but were he to remain in a transatlantic ship he would not receive that, as we only pay £22 a-month for transatlantic ships, and £24 a-month for inter-colonial ships.

7739. On first promotion?—Yes.

7740. To what does he rise?—He may rise from a chief engineer to some appointment on shore, either in the company's service or elsewhere, but there is nothing in our company beyond that rank. I have only one shore appointment of resident engineer under me in the West Indies, and one chief engineer for my assistant in Southampton.

7741. Have you any men who have retired from your service as chief engineers?—Yes.

7742. Do you give them anything on retirement, if a man retires on account of old age?—We had one who retired on that account, but I do not think that he ever asked for anything; probably if he had, I think he would have got something.

7743. A gratuity, I suppose?—Yes.

7744. But no pension?—No, no pension. We have an insurance in connection with the company, and the company insist upon every engineer and officer in its service insuring his life; each grade of officer receives a gratuity, which does not exceed £50, and I think £40 would be the highest amount that an engineer could receive.

7745. Is that an insurance by the company, or how is it managed?—About half is paid by the company in order to insure its being done; they insist upon it, it is partly a condition of the engagement.

7746. Is it stopped out of the men's pay?—Yes.

7747. What does the second engineer receive?—He has £12 a-month to begin with, and after 7 years £14 a-month, that is next after the chief.

7748. And then they go down in pay by a graduated scale?—Yes, the next is £10 a-month, the next £9 a-month, and the next £8 a-month, the latter two are the juniors; boiler-makers inter-colonial, £9 a-month, and the others £7 10s. a-month, that is on the transatlantic route, and they are the oldest boiler-makers that we have.

7749. Five shillings a-day?—Yes, in all cases they are found in their provisions, bed, bedding and everything in fact.

7750. And wine?—They receive equal to 2s. 6d. a-day wine money. They are allowed to have either half-a-pint of brandy, and a bottle of malt liquor or a pint of wine and a bottle of malt liquor.

7751. If a man does not want to have anything, can he draw the 2s. 6d.?—No, they draw then 1s. 10d.

7752. If they be teetotallers or in harbour?—No matter where they are, except it be in Southampton harbour, there they go on shore pay and what we call lodging money.

7753. What is their shore-pay?—Just their sea-pay with 14s. a-week added to it.

7754. At that time they can either take their 1s. 10d. or their wine?—Yes, at all times; they sign a card for everything they have, and it goes to the bar, and those cards are reckoned up at the end of each week, and placed in the wine-book; each

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engineer signs for what he has had, and is supposed to pay over whatever may be due, or get the difference whatever it may be.

7755. Then when in harbour in Southampton how about their mess?—They get no mess then.

7756. That 1s. 10d. a-day goes to it?—No, they have their sea-pay, with 14s. per week added to it.

7757. What is the indicated horse-power of your largest class of ship?—Approaching 4000 horse-power.

7758. In a ship of that class what number of engineers have you?—Six engineers, which is the greatest number, and a boilermaker, that is one chief engineer, five engineers, and a boilermaker. Then we have three men that we employ as general assistants, whom we call Greasers.

7759. What are they, mechanics?—A better class of firemen; they are picked out from old firemen, and are men upon whom you can depend to do what they are told to do.

7760. But they are not in any way trained mechanics?—No, not in any way.

7761. Not what we call stoker mechanics?—No, simply leading stokers, and there is one in each watch.

7762. Who is capable of driving an engine on an emergency?—No, I do not think so, I do not think we have a general assistant in the service who could stop or start an engine; they have never had any practice in that way, as we are never without engineers; all that the general assistant does is to lighten the labours of the engineer of the watch, and other duties which he may be put to.

7763. One of the engineers has special charge of the stokehold?—He has special charge of the stokehold, and also a certain portion of the engines, when not too far apart.

7764. But he is under the other man, one is senior, and the other is junior?—Yes, we have certain established regulations, which must be carried out, but they may be slightly altered in order to suit the convenience of circumstances.

7765. In how many watches are the engineers?—In three watches at sea, 4 hours on, and 8 hours off.

7766. Who keeps the engine-room register?—The chief engineer.

7767. With his own hand?—Yes.

7768. He is responsible for it?—Yes, and it is signed every day by the captain.

7769. You have no other mechanics or artificers in the engine-room besides those whom you have mentioned?—That is all.

7770. Your engineers do all the mechanical work?—Yes, all.

7771. Where is your chief depôt in the West Indies?—At St. Thomas's, but we really have no depôt there.

7772. No dockyard?—No; we have a small place which we call a factory, but it is a small galvanized iron shed, with a couple of lathes in it, and one fire; it is a very small place.

7773. Supposing you wanted to execute repairs in the West Indies, what would you do?—We have never really had to go into that, but we could not do heavy repairs; our ships are always supplied with spare gear.

7774. And you have a sufficient staff of engineers to carry out any small repairs needed?—Yes, but we could not attempt in the West Indies the refitting of a ship, but if, for instance, a shaft, required changing, we could do that at St. Thomas's.

7775. Do you take spare shafts with you?—We have them at St. Thomas's.

7776. I suppose you do not require any educational standard in the men whom you take as engineers?—Yes, we do, we require to know that they have sufficient education, or are able to instruct themselves sufficiently to be able within a very limited time to pass the Board of Trade examination, which

is now compulsory. That is to say, there are two certificated engineers in every ship of over 100 horse-power.

7777. And they have to pass the Board of Trade examination?—Yes, our engineers pass quite as high an educational examination as is necessary, but our great test is mechanical. If we have a thoroughly practical mechanical man, who can pass the Board of Trade examination, that is the man who suits our purpose best.

7778. Have you compound-engines in your ships?—Yes, in nearly all of them.

7779. Is there no more difficulty in handling them, than in handling the others?—I cannot say that there is; they may require a little more sharp judgment.

7780. Have you surface condensers?—Yes.

7781. Where do your engineers mess?—In a separate mess for the junior engineers, called the second engineers' mess-room; the second engineer and the second officer have their mess separate, but generally located near each other.

7782. Why do not the junior officers and the engineers mess together?—There are many inconveniences in that arrangement; the engineers arrange their mess a little differently to the officers. We do not like an engineer to be relieved during his watch for any meal; they change the watches round in a voyage to the West Indies and back; one engineer keeps the 8 to 12 watch, and the other the 12 to 4 watch in the run from Southampton to St. Thomas's; and from St. Thomas's to Cologne, the 4 to 8 watch coming home; and the engineer who keeps that watch or any other watch, is never allowed to leave the engine-room for any meal, so that they are compelled to have two or three separate meals to admit of this.

7783. Do they keep the 4 to 8 watch in the evenings right home?—No; the engineers keep watch one against the other, and so jealously do they do so, that they will contest to whom a certain revolution belongs, and every engineer keeps a log of his own revolutions, and coals expended.

7784. What reward or punishment is there in order to encourage that sort of zeal?—Nothing but promotion.

7785. How is that regulated?—By proficiency and good conduct.

7786. Not by seniority?—Not at all times; all things being equal, it might be.

7787. But you pick from your best men?—Yes.

7788. Who judges of their merit?—That is a matter which is left in my hands. I control the whole of the engineer department, with the approval of my Directors.

7789. How do you judge of a man's character?—From the reports which I receive from the chief engineers and captains, which are made out every voyage.

7790. You know what report a chief engineer makes of them?—Yes, a copy is sent to me, and one to the Directors.

7791. (*Captain Commerell.*) Do you think that your engineers generally would sooner have promotion by seniority or by selection?—I think they would sooner have it as it is, but I would myself if two men were equal in all respects, give promotion to the senior man. A man knows that a record of his conduct and actions is kept, and the moment he complains that he has not had justice done to him, he can be shown at once that the reason of it is his own fault.

7792. (*The Chairman.*) If a man commits himself seriously, what means have you of trying him; do you try him by an Inquiry?—Yes; if anything is required beyond my own control, which is very seldom (I have not had a case of that sort for the last three years), I should call him before the captain of the ship, and the chief engineer of the ship. I would then tell the man what the opinion arrived at was, but in ordinary cases I would deal with it

myself. If it were a case of dismissal, I would dismiss the man, giving him a letter showing for what he had been dismissed, this being always subject to the approval of my Directors.

7793. Are your coal trimmers and stokers a different class of people from the others?—Yes.

7794. The coal trimmers rarely attend in the stokehole?—Of course we make all our firemen from coal trimmers; we give our firemen £4 5s. a-month, and our coal trimmers £2 15s. a-month.

7795. From what country do your firemen come as a rule?—They are nearly all Englishmen. They have in addition to their pay 5s. a-month for their grog, if they do not drink it.

7796. Who would do any coppersmith's work on board that you wanted done?—Generally speaking, our own engineers would be capable of doing any coppersmith's work that might be required.

7797. They all have a smattering of it?—I may explain to you, that when we take them into the factory, we have a system, which is this: supposing I put on half a dozen young men to work in the factory, I would put them on indiscriminately, ordering certain work to be turned out; that work would be examined, and if they were proved to be not efficient, their services would be dispensed with; they would not be put on what we call our seagoing books, unless they were professed mechanics of good ability.

7798. Are there among boilermakers two or three classes of trades, and do you select any particular class?—We generally take what would be called a boilersmith, that is, a man who is accustomed to set angle-iron and dress tools, and do all those sort of things, but still quite able to do any caulking or patching required for the boilers.

7799. And to do smith's work besides?—Yes, that is the principal thing.

7800. Angle-iron smith's work?—What they call boilersmith's work, really more of a smith than a boilermaker, but they have been brought up as boilermakers.

7801. (*Captain Dowell.*) Do you find any difficulty in getting candidates for the position of engineers in your service?—No, I should say that we have 30 applicants at this moment.

7802. Who are socially of a class that you would like to have?—About 10 per cent. would be inefficient, or not first-class workmen.

7803. Is it at all often that you have to reject or discharge engineers, after having once entered them?—We do not make any ceremony about that; if a man after coming home from his first voyage is not found suitable he is discharged. It may be in some cases that we get a man who can never get over sea-sickness, and then it is not a bit of good keeping him; in that case we should immediately dismiss a man.

7804. They are not bound for any time?—No, they are free to go at the end of every voyage, and we are free to dismiss them at the end of every voyage.

7805. With reference to your chief engineers, do you keep them in your service without any limit as to their age?—We have never been compelled to get rid of a man on account of his age; we have had one or two who have retired, but they have resigned through getting old men. As long as they are capable, we keep them. That is a thing which has never come within our province to deal with; but I should say that our oldest engineer is about 58 years old.

7806. (*The Chairman.*) Are the engineers as a rule healthy men?—Yes, they are very healthy men.

7807. (*Captain Dowell.*) Do the engineers suffer more than the other officers of the ship from the effects of climate?—No, not so much. Our firemen attribute a great deal of their good health to the drinking of nothing but oatmeal and water. Limes are plentiful,

(3572)

and they put half a dozen limes into a certain quantity of water with oatmeal in it, which makes very capital drinking.

7808. As a rule, are your officers and stokers abstainers?—No, they are not; I am rather sorry to say they all take their grog, but of course we do not keep those who take too much; they all take it more or less; we have some men who are more abstemious than others, but I do not know of any teetotallers in our service.

7809. (*The Chairman.*) What grog do they drink, brandy or rum?—I think that they mostly drink whisky.

7810. Supposing any of the engineers were passed over, and not promoted to the rank of chief, do they complain about it?—They do, but of course they get a reasonable answer, which satisfies them.

7811. Up to what age have you allowed an engineer to remain as such?—We have one or two second engineers that have been about 16 or 17 years in that position, and they are getting to be about 41 to 42 years of age. They will never be chief engineers, but as they are they are very excellent servants.

7812. What is the youngest age at which you promote a man to the rank of chief engineer?—I do not think at anything under 30 years of age.

7813. Would you promote a man over a certain age?—We used to have a rule, not to promote a man if over 45 years of age, but that has been abolished. It extended to captains and chief engineers also. A chief officer could not be made a captain after that age.

7814. Does the boilermaker mess with the young engineers?—Yes.

7815. (*Captain Commerell.*) Does the pay of your boilermakers increase according to their length of service?—No, it remains stationary.

7816. Do they get 1s. 10d. a-day wine-money?—Yes, the same as the engineers.

7817. Does the insurance fund hold good with them?—Yes, the same as with the engineers.

7818. Have you any difficulty in getting boiler-makers?—No, not in the least.

7819. (*Mr. Wright.*) When a ship comes into Southampton, do the engineers assist in the repairs required?—Yes, they do, the greater part of them. For instance, a ship may arrive in Southampton to-day, and everyone clears out as soon as the boilers are blown off, and everything is wiped down, and the ashes put up properly; the chief engineer goes round with the second engineer to see that this duty is done, then they get leave till 9 o'clock next morning, when all of them resume work. There is a book kept of the time a man keeps in harbour, and when the work is completed we get steam up to try the engines, and then there is nothing to do but clean and wipe them down, and we give leave to men when they can be spared.

7820. (*Captain Commerell.*) They do not get any regular leave when in harbour?—No.

7821. (*Mr. Wright.*) What number of stokers and coal trimmers have you in that big ship that you gave the number of engineers for?—Our largest class of ship was the "Shannon." We had 12 firemen, 10 coal trimmers, 3 general assistants, and 1 engineer storekeeper; that was the whole of the crew.

7822. (*The Chairman.*) When the engineers are working at Southampton on repairs, supposing that, on an emergency, you wished to bring on a ship, and the men worked over-hours, would they receive pay for it?—Yes.

7823. What pay?—All engineers receive at the rate of 6s. a-day for overtime; we pay them time and a-half at that rate. Supposing a man worked for two hours, we would give him three hours for it, and we pay them at the rate of 6s. a-day of ten hours. That would be in addition to their ordinary pay.

7824. If they worked 3½ hours they would get 5 hours for it, or 3s. ?—Yes, exactly.

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7825. And is it the same with the boilermakers?—Yes.

7826. Do they work at any repairs which are required to be done in the factory?—No; we very often have to give them help; but if a ship is laid up we do the whole of the work which is necessary to be done, we then withdraw the engineers, and either take them into the factory permanently or send them on board some other ship.

7827. (*Captain Commerell.*) Are they always on pay?—Yes, always, when at work, but there is no pay when there is no work.

7828. (*The Chairman.*) For how long do you enter your firemen?—They sign articles every voyage. We are obliged to liberate them when they return to England; within 24 hours of their return to England we pay them off.

7829. When your engineers enter is there any contract between you, do you enter them for a certain period or not?—No.

7830. They are simply entered for the voyage?—Yes; at the end of a voyage if a man wants to go he has only to resign.

7831. The engineers are treated in the same way as the ship's company?—Yes, they are all treated alike, all the officers, the captain and all; they agree for one voyage only.

7832. Except in the coasting vessels?—Quite so; in certain ports, in the home trade vessels, I think that the system is different.

7833. Do you keep your best men in the inter-

colonial or transatlantic trade?—We suppose our best men to be the senior men, when they become to be chief engineers, and of course we give them as nearly as we can transatlantic ships.

7834. The inter-colonial pay is higher, is it not?—But we make them sign an agreement for two years when going inter-colonial, the voyage is never ended as it were, as the ship never comes into an English port.

7835. Are the inter-colonial vessels smaller than the others?—Yes, much smaller.

7836. (*Captain Dowell.*) Do you find in the West Indies that the men suffer from the climate?—Of course some men suffer a little, but as a rule they do not.

7837. (*The Chairman.*) Do your engineers wear a uniform?—Yes.

7838. Which they have to provide for themselves I suppose?—Yes.

7839. They have no other allowances beyond pay and provisions?—Their provisions and finding are very complete.

7840. (*Captain Dowell.*) Have they table linen and bed linen?—Yes; everything is found them, plate and cutlery; the same as are used in the saloon by the first class passengers; any breakage is stopped out of their pay.

7841. (*The Chairman.*) Breakages of crockery and glass?—Yes, but a reasonable amount of breakage is allowed for.

(*The witness withdrew.*)

WILLIAM WALLACE, Esq., called and examined.

7842. (*The Chairman.*) What position are you now holding?—I am superintending engineer of the Allan Line of Steamers.

7843. Where is their head quarters?—In Liverpool.

7844. Have you a factory there for repairing your own engines, or do you get them repaired by contract?—We have a factory there.

7845. From where do you obtain your engineers for your ships?—From no particular source; we get them just as they make application.

7846. From the private engine works of the country?—Yes, from the private engine works of the country.

7847. Have you any limit of age for the men that you enter?—No, none.

7848. Do you insist upon it that they shall have served their time as fitters, or in a marine engine factory?—Yes; I insist upon that.

7849. As fitters or engine smiths?—As fitters.

7850. What is the indicated horse-power of your largest ship?—3000 horse-power.

7851. What complement of engineers have you?—Seven, including the chief.

7852. Is one of the other six engineers a boiler-maker?—In the new ships I put them all in as engineers until the boilers become a little old, and require repairs.

7853. Among the engineers, is there a boiler-maker?—No; not when the ships are new.

7854. Are there always two engineers on watch at the same time?—Yes; always two.

7855. In how many watches are the engineers?—In three watches.

7856. Is that invariable?—Yes; that is invariable.

7857. To and from what ports do your large steamers run?—In summer time from Liverpool to Quebec and Montreal, and in winter time to Portland and the United States.

7858. Have you any steamers on the other side

that do not make the homeward voyage?—Yes; we have two, one that runs down to Halifax from Portland.

7859. Are the men in your service on the same terms as those in transatlantic ships?—Yes; on the same terms.

7860. Can you tell the Committee what pay the seven men receive as a rule?—When first the Company started, the chief had £18 per month, £15 per month the second, £12 per month the third, and all the others £10 per month, nothing below £10 per month. Then about two years ago the first, second, and third were raised; the first got £20 per month, the second got £17 per month, and the third £15 per month. The chief engineers after they have been in our service for 2½ years as a chief engineer, I give a bonus of £48 a-year, £12 a-quarter, but of course they do not sign articles for that; that is at my discretion if they behave themselves, and keep the machinery in good order, but they do not get it until they have been 2½ years as chief engineers.

7861. Have you served afloat yourself as an engineer?—Only in going out with a new steamer from the factory.

7862. Your engineers, I suppose, do all the repairs of the machinery of the ships afloat?—Yes, the whole of them.

7863. And when they come home, do they carry out any repairs that may be wanted?—They examine all the moving parts, the pistons, the slide valves, and all pumps, and all the valves connected with the pumps; then they do such as odd work, making pumps and pump joints, or any actual repair of defects that there may be. Then of course I have a shore staff; I have, as it were, three different staffs, the staff in the factory, the shore staff, and the staff on board ship; when there is anything new, the shore staff puts it together; for instance, if we are going to put in a pair of connecting rod braces, we do it for the chief engineer, but he sees it finally

finished; it comes in the regular routine of the duties of the engineers attached to the ship.

7864. Do they repair their own boilers to any extent?—We do it for them, except when a boiler-maker is appointed to a ship; in that case we take off an engineer and replace him with a boiler-maker, and he would do all the repairs afloat.

7865. What pay do you give that boiler-maker?—£10 a-month, the same as the junior engineers.

7866. And he would be in all respects the same as an engineer on board ship?—Yes.

7867. In addition to their pay, they are found in everything, I believe?—Yes, except wines; any wines they have they must pay for themselves.

7868. Do not you give them any allowance for wine?—They have no other money allowance beyond what I have mentioned.

7869. They have their food?—Yes.

7870. But all wine they pay for themselves?—Yes.

7871. Where do the younger and junior engineers mess?—All the engineers mess together.

7872. Where do they mess?—In a separate mess, and the chief engineer is at the head of his own department.

7873. Do the officers of the ship mess with them?—No; they have a separate mess.

7874. Why do not they join them?—It never has been so, and I do not think it would work well. I do not think they would agree very well.

7875. Do the engineers of the ship when they are in England work on shore in your factory at all?—They are always on board ship.

7876. Do you pay them anything for extra hours, supposing they have got to work on an emergency?—Supposing they had to work till 10 o'clock every night, they would get nothing extra for it.

7877. Do you give them leave when they come home?—Very seldom; sometimes when they ask for a week away while the ship is in port, they have it; but the ship is never in port for more than a week, and sometimes only for three or four days.

7878. Do you train up your own men as engineers as a rule, or do you enter older and trained men as engineers?—Since we have had a factory, we have trained them ourselves.

7879. Do you train them up in the factory from boys?—Yes, sometimes.

7880. They are apprentices I suppose, and then you take them on?—Yes; they are removed from the factory to the shore staff, so that they have experience in taking engines to pieces, and seeing the general routine of the work.

7881. How do you ascertain if a man has any knowledge of the engines before going to sea, or do you trust to their learning their business as engineers?—Of course if they come from the factory they have no experience; in some ships where there are five engineers, a man will go on for one voyage with the third engineer, and the third engineer will only take a watch for the voyage; out to Quebec or Montreal say. They are pretty well brought up on board, but of course I have lots of them that come from other ships, and who have had experience in working engines before I get them; I prefer that they should have experience before they come to us.

7882. If they have it before they come to you, you put them on higher pay at once, I suppose?—They must go at the lower pay at first.

7883. How do you raise their pay, by seniority or selection by qualities?—We select them by their qualities.

7884. And a man is made a chief engineer in the same way?—He would require to be a long while with me before being made a chief engineer, the chances of attaining that rank are very seldom.

7885. How many chief engineers have you, do you suppose?—About 17.

7886. And they have been with you for a long time?—Yes; some for 15 or 16 years.

7887. What is the age of the youngest man whom you have ever made chief engineer?—I have had a chief engineer as young as 30.

7888. Supposing one of the chief engineers fell ill or died, how would you replace him?—If the second engineer had been for a long time in that ship, and was next for promotion, then I would give him the position.

7889. Then you really would promote them by seniority, if capable?—Yes; but I have some second and third engineers that I would not raise above that position.

7890. As far as raising the pay is concerned, and becoming second, third, fourth, or fifth engineers, whatever that may be, it is by length of service?—Yes.

7891. You rarely promote one man over another?—Very seldom indeed.

7892. To what age do you keep a chief engineer on, or have you laid down any limit of age?—I have not.

7893. At about what age do you think a man would be unfit for service?—I should say that a man would be very good at from 50 to 60 years of age.

7894. Have you any as old as that?—No.

7895. What is the age of your oldest?—About 45 years.

7896. What pay is he getting?—He will be in receipt of £20 a-month, and his bonus of £48.

7897. To what test do you put them before you take them, or have you any examination or test, is it the Board of Trade examination only?—Principally that.

7898. They have to pass that?—Yes; they must pass the Board of Trade examination; of course I ask them to write a letter of application, so as to see what their education is.

7899. How many pass the Board of Trade examination?—The first and second engineers.

7900. If a man does not pass the Board of Trade examination when he shall have arrived at the age when he would be made a first or second engineer, would you keep him?—The first and second engineers must pass it.

7901. Do you mean that the Board of Trade would not be satisfied if a third passed?—Yes; if he passed for second.

7902. But supposing you had a man for second, who could not pass, you would not keep him?—He would have to go down as third; the second engineer must have passed the Board of Trade examination; that man who did not pass, might be a pretty good mechanic and probably a better man in the engine-room than the man who did pass.

7903. But you would be compelled to put him down and put another man over him?—Yes.

7904. (*Captain Dowell.*) I understand that you have men in your service in that position who go on serving knowing that they have no chance of rising to a higher position?—Yes.

7905. Some will not attempt to pass the examination?—No.

7906. Have you any difficulty in filling your vacancies?—No, none whatever.

7907. You say that in a great measure you now fill your vacancies from your own factories; you enter them as apprentices and train them up?—It is limited in our factory, we have not many, but of those we have after their time is out, I should give them the preference of entering our service, if they were attentive to their work; they would be put on the shore staff, and not sent to sea for a couple of years; on the shore staff they gain a certain amount of experience; they have another course of operations to go through, such as going into ships and so on. After they had been there for two or three years, then I would put them on as seventh engineer in the large boats, or fifth engineer in the smaller boats.

7908. If you entered them from the outside, or

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from the shore, as we say, or a candidate applied to you to enter your service as junior engineer, what examination would you put him through, or do you take his indentures merely?—I should take his indentures, but before I put him on board ship, on the articles of the ship, he would require to be with me for some time, say for three years, on the shore staff.

7909. (*The Chairman.*) Do you always keep them on the shore staff?—Yes, any one applying for a situation to go to sea I always keep on the shore staff, so as to have it well filled up, in the event of an emergency arising.

7910. (*Captain Dowell.*) Practically you never send a man to sea without having tested him first?—No, never.

7911. In fact, practically, you supply your ships with engineers from your shore staff?—We do, and those men have been with other companies on board smaller ships, and they have a desire to come into the Mail Company's service, or the Cunard or Inman boats; probably they have been in some Mediterranean steamers, and they want a change. If I find that such men are of good character, which I judge of by the characters I receive with them, then I test them on the shore staff, to see whether they are properly qualified workmen or not.

7912. You say that your ships are sometimes in port for a week, and sometimes for a less time; do you generally re-enter the same crew?—Yes, sometimes, they have only 24 or 48 hours discharge.

7913. Though it is an absolute discharge at the time, still it is only a formal matter?—Yes, it is formal; a ship requires to be discharged and unloaded, and the men are paid off on Saturday say, and sign articles on the same day for another voyage; then the men on the shore staff go on board and do the whole of the overhauling which is necessary, because the men of the ship want a few hours to see their friends after coming from a voyage; we do with the shore staff the whole of the moving parts for them, because I have got men whom I consider to be trustworthy men.

7914. How many watches do your engineers keep?—Four on and eight off, and going down channel watch and watch.

7915. Who keeps the engine-room register?—The chief engineer.

7916. The engineer of the watch?—Yes, each engineer keeps his own register, and the chief engineer fills up the book of course.

7917. (*Captain Commerell.*) Tell me what you pay your fitters in your factory?—A good man we pay on an average about 32s. per week, but I have some who receive as high a rate of pay as 36s. per week, and some at 38s. per week.

7918. You think that you would get as thoroughly good a man as you require for between 32s. and 36s. a-week?—Yes, a first-rate mechanic.

7919. Have you any arrangement in your factory for the engineers to insure their lives?—There is a certain insurance fund which they have among themselves, and which all the company's men belong to; they pay so much, I forget how much it is, a voyage, for a certain proportion; you may call it a sick fund for it is in the event of sickness, but in the event of the death of an engineer or officer, I think the relatives get £20, in sickness they get the attendance of a doctor. All the sailors and firemen by paying a certain amount into that society, get medical assistance and so much per week in the event of illness.

7920. That is a private concern amongst themselves?—Yes.

7921. The company has nothing to do with it?—No, nothing whatever.

7922. What do your shore party of engineers get per month, those who are ready to fill up any vacancies on board ship?—From 32s. to 36s. a-week.

7923. Regular pay as fitters?—Yes.

7924. You mentioned that your chief and other engineers used to mess with the passengers?—No, the chief engineers only.

7925. May I ask you why you discontinued that practice?—I think it was on account of some complaint of the junior engineers in reference to their mess. There had been several complaints, and I suggested to the company that the best way to get rid of them was to make the chief engineer head of his own mess; and when there, to see whether the others were properly treated or not, as any complaints taken from the chief engineer might be considered reliable.

7926. It was for the better superintendence of the engineers' mess?—Yes; it was at my suggestion, but the Cunard Company engineers never did mess in the saloon, and I instanced that; and of course Messrs. Allen said, "We will do so," and I think it is the best way. I think sometimes that the stewards would take advantage of the other and junior engineers, and there would be no one to support them; and in order that the juniors should have support I suggested that the chief should be head of his own mess.

7927. While the ship is in harbour, is the engineers' mess going on just the same?—No, there is no mess in harbour.

7928. Do they get an allowance then?—No, no allowance.

7929. They are supposed to mess at home with their friends?—Yes, they do.

7930. There is no engineers' mess at all going in harbour?—None whatever. When a ship comes to Liverpool, and after she has discharged her cargo, they are all dispensed with.

7931. Do you ever find any difficulty or complaint about doing manual labour in the boilers?—No, never.

7932. They understand that they are entered for the purpose, while abroad, of completing the repairs of the boilers when necessary?—Yes, it is so understood.

7933. Of course when you have no boilermaker, the engineers have to do the necessary repairs, patching the boilers and so on?—Yes, and if there are leaky tubes, they have to go to the back of the furnace and tighten them up.

7934. (*Mr. Covey.*) You say that the engineers are not messed in harbour, are any of the other officers messed in harbour?—No, none; they are all on an equality in that respect.

7935. Do you have many engineers leave your service?—No, they very seldom leave us.

7936. Do they live to any great age at all?—The company has been in existence for 20 years, and we have had some in our service for 15 years.

7937. (*The Chairman.*) Are they pretty healthy men?—Yes, as a rule they are; the North American trade is a very healthy trade, and the engineers are very seldom laid up by sickness.

7938. (*Captain Commerell.*) Do you think their health compares favourably with that of the other officers?—Yes, it does.

7939. Do you think that they are more or less healthy than the other officers?—I think they are about alike.

7940. (*The Chairman.*) When an engineer is sick on board, is he attended by the medical officer on board?—Yes.

7941. When sick at home, do they receive attendance from the medical officer on board?—No, none.

7942. For how long do you allow an engineer to be sick before you stop his pay?—I might continue him on full pay probably for about a couple or three months; that is on sea pay, and then I should reduce him to the shop pay.

7943. About half-pay or something of that sort?—Yes.

7944. Are your iron ships in compartments?—Yes.

7945. Who is responsible for the watertight doors, and the various pumps and valves below, away from the engine-room?—The carpenter.

7946. Is the engineer responsible for all those inside the engine-room?—Yes.

7947. Do you know whether he appoints one special engineer to watch over the watertight doors and valves, or is it generally done by all the staff?—The chief officer attends to that with the carpenter in order to see that all is right.

7948. Is the carpenter responsible for those things being kept in good order outside the engine-room?—Yes; in a merchant ship there are not many valves that the carpenter has got to look after; there are merely small sluice valves in each bulkhead.

7949. Who has charge of the pumps?—The engineer; the carpenter marks on a slate in every watch, what water there is in each compartment, and the engineer works accordingly.

7950. The carpenter sounds them, and reports the water in them every watch?—Yes; the number of inches of water in each compartment.

7951. What other small engines have you in the ship besides the engines of the ship and the steam winches?—There are four or five steam winches.

7952. Who has charge of the steam winches?—The chief engineer.

7953. Are they generally worked from a separate boiler?—Yes; they are generally worked from a separate boiler.

7954. What fog signals have you in your service?—A whistle on the main boiler.

7955. Are the smaller boilers for working the steam winches of higher pressure, or the same pressure as the main boilers?—Of a less pressure.

7956. They take the steam pressure from the main boilers?—Yes.

7957. (*Captain Commerell.*) What is the pay of your carpenter?—He has £8 a-month.

7958. (*Mr. Covey.*) Who has charge of the pumps outside of the engine-room?—What we call the hand pumps are in charge of the carpenter, the manual pumps.

7959. (*Captain Dowell.*) About what number of stokers or firemen have you in your largest ship?—Thirty.

7960. What is her indicated horse-power?—3000 horse-power; that 30 would include a storekeeper

and 4 Greasers, it includes Coal Trimmers, Firemen, Greasers, and a Storekeeper.

7961. (*The Chairman.*) What pay does the storekeeper receive?—The same as the firemen, £4 15s. a-month; present wages £5 per month.

7962. What do your coal trimmers get?—£4 a-month; present wages £4 15s.

7963. (*Captain Dowell.*) I suppose you enter the same men continually; they do not leave you?—No; we re-enter the same men continually.

7964. Have you any limit to the age at which you enter them?—No.

7965. (*The Chairman.*) What convenience do you give your engineers for washing when they come off duty, is there a bath room?—There is a place for them forward where they can go and wash.

7966. On deck?—Yes, on deck.

7967. Do the firemen have the same place?—Yes; there is an open part in the fore-castle, and they generally take a bath there.

7968. (*Captain Commerell.*) But you have no special bath-room for them?—No.

7969. We have had it in evidence that one of the principal complaints of the engine-room artificers in our service is, that they have no special bath-room for themselves, and that they are obliged to wash in the stokers' bath, should you think that a very valid complaint?—I do not think it would be.

7970. (*Captain Dowell.*) Do the boilermakers come from a lower social class than the engineers?—No, they are just the same; the man has only taken to boilermaker's work instead of to fitter's work.

7971. (*The Chairman.*) Do you consider that the one trade is as good as the other?—Yes; my present foreman boilermaker was boilermaker in the Cunard service for 17 years.

7972. (*Captain Commerell.*) What made him leave the Cunard service?—For the chance of getting on shore, I believe.

7973. (*Mr. Wright.*) I suppose that all you say about your engineers would apply to the engineers generally going out of the port of Liverpool?—Yes, it would.

7974. (*The Chairman.*) Are most of your men in the factory married men?—Yes; the largest proportion of them are married men; some of the juniors are not married, but I think that most all of those in the factory are married men.

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(*The witness withdrew.*)

APPENDIX II.

 No. 1.

Present and Proposed Complements of Engineer Officers and Engine-room Artificers for all Ships and Vessels fit for Service, including those in an advanced Stage of Building; also Numbers required for Service in Dockyards and Reserves in addition to these in case of War, supposing all Ships Commissioned.

SUMMARY.

Description of Ships	Present Complement			Proposed Complement		
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers
21 Twin-screw ironclads	19	124	92	21	102	112
31 Single-screw ironclads	29	168	70	31	110	131
24 Ships of the line and frigates ..	24	113	49	24	75	95
28 Corvettes	28	84	43	28	44	84
31 Sloops	11	71	41	27	34	65
57 Twin-screw gunboats .. ..	..	121	61	34	57	91
37 Single-screw gunboats .. ..	..	77	34	—	71	43
24 Troopships, storeships, &c. ..	22	102	32	24	55	85
11 Tenders .. ..	..	16	8	..	13	18
Reserves and dockyards	43	176	60	43	133	111
Total	176	1,052	490	232	694	835

October, 1875.

COMPLEMENTS OF ENGINEER OFFICERS.

Names	Horse Power		Present Complement			Proposed Complement			Remarks
	Nominal	Indicated	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	

TWIN-SCREW IRONCLADS.

Alexandra .. ..	..	8,000	1	9	9	1	8	10	
Inflexible .. ..	..	8,000	1	9	9	1	8	10	
Dreadnought	1,000	8,000	1	9	9	1	8	10	
Temeraire .. ..	..	7,000	1	8	8	1	8	8	
Devastation	800	6,649	1	10	4	1	6	8	
Thunderer	800	5,600	1	10	4	1	6	8	
Nelson .. ..	..	6,000	1	8	8	1	8	8	
Northampton .. ..	..	6,000	1	8	8	1	8	8	
Rupert	700	4,638	1	6	3	1	5	4	
Invincible	800	4,832	1	6	3	1	5	4	
Iron Duke	800	4,268	1	6	3	1	5	4	
Audacious	800	4,021	1	6	3	1	5	4	
Penelope	600	4,703	1	6	3	1	4	5	
Hotspur	600	3,497	1	6	3	1	4	5	
Glatton	500	2,868	1	5	3	1	4	4	
Cyclops	250	1,660	1	2	2	1	2	2	
Hecate	250	1,755	1	2	2	1	2	2	
Hydra	250	1,472	1	2	2	1	2	2	
Gorgon	250	1,670	1	2	2	1	2	2	
Viper	160	696	..	2	2	1	1	2	
Vixen	160	832	..	2	2	1	1	2	
Total .. ..	..	92,161	19	124	92	21	102	112	

IRONCLADS (SINGLE SCREW).

Minotaur	1,350	6,702	1	7	3	1	5	5	
Agincourt	1,350	6,867	1	7	3	1	5	5	
Northumberland	1,350	6,558	1	7	3	1	5	5	
Warrior	1,250	5,469	1	8	2	1	5	5	
Achilles	1,250	5,722	1	8	2	1	5	5	
Black Prince	1,250	5,772	1	8	2	1	5	5	
Sultan	1,200	8,629	1	9	4	1	5	8	
Hercules	1,200	8,529	1	9	4	1	5	8	
Monarch	1,100	7,842	1	8	4	1	5	7	
Bellerophon	1,000	6,521	1	6	3	1	5	4	
Lord Warden	1,000	6,706	1	6	3	1	4	5	
Prince Consort	1,000	4,234	1	6	3	1	4	5	
Royal Alfred	800	3,434	1	6	2	1	4	4	
Hector	800	3,256	1	6	2	1	4	4	
Repulse	800	3,347	1	6	2	1	4	4	
Valiant	800	3,560	1	6	2	1	4	4	
Shannon .. ..	..	3,500	1	5	2	1	4	4	
Swiftsure	800	4,913	1	5	4	1	4	5	
Triumph	800	4,892	1	5	4	1	4	5	
Resistance	600	2,428	1	5	2	1	4	3	
Defence	600	2,587	1	4	2	1	4	3	
Pallas	600	3,581	1	4	2	1	4	3	
Prince Albert	500	2,128	1	3	2	1	3	3	
Favourite	400	1,773	1	3	1	1	2	3	
Wivern	350	1,446	1	3	1	1	1	3	
Scorpion	350	1,455	1	3	1	1	1	3	
Research	200	1,042	1	3	1	1	1	3	
Terror	200	493	1	3	1	1	1	3	
Erebus	200	400	1	3	1	1	1	3	
Enterprise	160	692	..	3	1	1	1	2	
Waterwitch	160	777	..	3	1	1	1	2	
Total .. ..	..	125,255	29	168	70	31	110	131	

Names	Horse Power		Present Complement			Proposed Complement			Remarks
	Nominal	Indicated	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	

SHIPS OF THE LINE AND FRIGATES.

Atlas	800	3,732	1	4	2	1	3	4	
Anson	800	3,583	1	4	2	1	3	4	
Defiance	800	3,550	1	4	2	1	3	4	
Donegal	800	3,103	1	4	2	1	3	4	
Duncan	800	2,826	1	4	2	1	3	4	
Revenge	800	5,639	1	4	2	1	3	4	
Inconstant	1,000	7,361	1	7	2	1	4	5	
Shah	1,000	7,500	1	7	2	1	4	5	
Raleigh	800	5,639	1	5	4	1	4	5	
Rover .. ..	..	4,750	1	5	3	1	4	5	
Bacchante .. ..	..	5,250	1	7	2	1	4	5	
Boadicea .. ..	..	5,250	1	7	2	1	4	5	
Euryalus .. ..	..	5,250	1	7	2	1	4	5	
Volage.. ..	600	4,532	1	5	2	1	3	4	
Active	600	4,015	1	5	2	1	3	4	
Doris	800	3,005	1	4	2	1	3	4	
Undaunted	600	2,503	1	4	2	1	3	3	
Newcastle	600	2,354	1	4	2	1	3	3	
Immortalité	600	2,391	1	4	2	1	3	3	
Topaze	600	2,538	1	4	2	1	3	3	
Glasgow	600	2,020	1	4	2	1	3	3	
Endymion	500	1,620	1	4	2	1	3	3	
Aurora.. ..	400	1,576	1	3	1	1	1	3	
Narcissus	400	1,731	1	3	1	1	1	3	
Total .. ..	..	91,718	24	113	49	24	75	95	

CORVETTES.

Sapphire	..	..	350	2,356	1	3	2	1	2	3
Opal	..	..		2,100	1	3	2	1	2	3
Amethyst	..	..		2,144	1	3	2	1	2	3
Diamond	..	..		2,155	1	3	2	1	2	3
Encounter	..	..		2,127	1	3	2	1	2	3
Modeste	..	..		2,177	1	3	2	1	2	3
Thetis	..	..		2,100	1	3	2	1	2	3
Briton	..	..		2,149	1	3	2	1	2	3
Druid (simple)	..	..		2,272	1	3	1	1	1	3
Blanche (simple)	..	..		2,100	1	3	1	1	1	3
Dido (simple)	..	..		2,518	1	3	1	1	1	3
Eclipse (simple)	..	..		1,946	1	3	1	1	1	3
Tenedos	..	..		2,032	1	3	2	1	2	3
Sirius	..	..		2,334	1	3	2	1	2	3
Danae (simple)	..	..		2,089	1	3	1	1	1	3
Spartan	..	..	1,582	1	3	1	1	2	3	
Emerald	..	..	350	2,100	1	3	2	1	2	3
Garnet	..	..			1	3	2	1	2	3
Tourmaline	..	..			1	3	2	1	2	3
Turquoise	..	..			1	3	2	1	2	3
Ruby	..	..			1	3	2	1	2	3
Cadmus	..	..	400	1,531	1	3	1	1	1	3
Thalia			1,597	1	3	1	1	1	3
Pearl			1,390	1	3	1	1	1	3
Challenger			1,261	1	3	1	1	1	3
Charybdis			1,472	1	3	1	1	1	3
Wolverene	..	..	1,329	1	3	1	1	1	3	
Juno	..	..	1,090	1	3	1	1	1	3	
Total	..	..	..	54,351	28	84	43	28	44	84

Names	Horse Power		Present Complement			Proposed Complement			Remarks
	Nominal	Indicated	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	
SLOOPS.									
Daphne	300	1,927	1	2	2	1	1	3	
Dryad	300	1,464	1	2	2	1	1	3	
Nymphe	300	2,172	1	2	2	1	1	3	
Vestal	300	2,154	1	2	2	1	1	3	
Albatross .. ..	..	838	..	2	2	1	1	2	
Daring.. ..	..	916	..	2	2	1	1	2	
Egeria .. ..	..	1,011	..	2	2	1	1	2	
Fantome .. ..	..	975	..	2	2	1	1	2	
Sappho .. ..	..	736	..	2	2	1	1	2	
Flying Fish .. ..	..	836	..	2	2	1	1	2	
Cormorant .. ..	..	..	..	2	2	1	1	2	
Osprey.. ..	..	..	..	2	2	1	1	2	
Pelican .. ..	..	..	..	2	2	1	1	2	
Wild Swan .. ..	..	..	..	2	2	1	1	2	
Penguin .. ..	..	..	..	2	2	1	1	2	
Pioneer, P.	80	509	..	3	..	..	2	2	
Shearwater	150	532	..	3	1	1	1	2	
Rapid .. ..	..	460	..	3	1	1	1	2	
Rosario .. ..	..	436	..	2	1	1	1	2	
Nassau.. ..	..	755	..	3	1	1	1	2	
Sylvia .. ..	..	689	..	3	1	1	1	2	
Fawn	100	434	..	2	1	..	1	3	
Arab	95	570	..	2	1	..	2	1	
Lily	95	570	..	2	1	..	2	1	
Spiteful, P.	280	796	1	2	1	1	1	2	
Myrmidon	200	720	1	2	1	1	1	2	
Reindeer	200	434	1	2	1	1	1	2	
Barracouta, P.	300	881	1	3	..	1	1	2	
Argus, P.	300	764	1	3	..	1	1	2	
Antelope, P.	260	646	1	3	..	1	1	2	
Buzzard, P.	300	853	1	3	..	1	1	2	
Total .. ..	..	27,578	11	71	41	27	34	65	

TWIN-SCREW GUN-VESSELS AND GUNBOATS.

Vulture	160	847	..	3	1	1	1	2	
Woodlark		881	..	3	1	1	1	2	
Magpie		857	..	3	1	1	1	2	
Seagull		702	..	3	1	1	1	2	
Frolic	100	896	..	3	1	1	1	2	
Kestrel		835	..	3	1	1	1	2	
Rifleman		715	..	3	1	1	1	2	
Ready		891	..	3	1	1	1	2	
Bittern	160	851	..	3	1	1	1	2	
Curlew		811	..	3	1	1	1	2	
Lapwing		882	..	3	1	1	1	2	
Philomel		961	..	3	1	1	1	2	
Ringdove		957	..	3	1	1	1	2	
Bullfinch		985	..	3	1	1	1	2	
Plover		977	..	3	1	1	1	2	
Swallow		892	..	3	1	1	1	2	
Avon	120	526	..	3	1	1	1	2	
Beacon		506	..	3	1	1	1	2	
Boxer		587	..	3	1	1	1	2	
Cracker		528	..	3	1	1	1	2	
Dwarf		495	..	3	1	1	1	2	
Elk		472	..	3	1	1	1	2	
Flirt		532	..	3	1	1	1	2	
Fly		489	..	3	1	1	1	2	
Gnat		500	..	3	1	1	1	2	
Growler		696	..	2	2	1	1	2	
Hart		608	..	3	1	1	1	2	
Hornet		506	..	3	1	1	1	2	
Lynx		526	..	2	2	1	1	2	
Midge		472	..	3	1	1	1	2	

Names	Horse Power		Present Complement			Proposed Complement			Remarks
	Nominal	Indicated	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engi- neers	Engineers and Assistant Engineers	Engine Room Artificers	
GUNBOATS (TWIN-SCREW)— <i>Contd.</i>									
Pert	120	502	..	2	2	1	1	2	{ Harbour Service
Rocket		632	..	2	2	1	1	2	
Teazer		489	..	3	1	1	1	2	
Thistle		641	..	3	1	1	1	2	
23 double screw small gunboats ..	28	230	..	23	23	..	23	23	
Total .. ..	..	30,087	..	121	61	34	57	91

SINGLE-SCREW GUN-VESSELS AND GUNBOATS.

Dart	80	336	..	3	1	3	
Nimble		330	..	3	..	..	1	3
Torch		281	..	3	..	..	1	3
Ariel	60	540	..	2	1	..	2	1	
Coquette		406	..	2	1	..	2	1	
Decoy		459	..	2	1	..	2	1	
Merlin		428	..	2	1	..	2	1	
Swinger		360	..	2	1	..	2	1	
Foam		406	..	2	1	..	2	1	
Goshawk	60	484	..	2	1	..	2	1	
Mosquito		501	..	2	1	..	2	1	
Zephyr		534	..	2	1	..	2	1	
Contest		515	..	2	1	..	2	1	
Cygnets		457	..	2	1	..	2	1	
Express		438	..	2	1	..	2	1	
Moorhen		360	..	2	1	..	2	1	
Sheldrake		360	..	2	1	..	2	1	
Mallard		360	..	2	1	..	2	1	
Cherub	60	236	..	2	1	..	2	1	
Dasher		200	..	2	1	..	2	1	
Britomart		277	..	2	1	..	2	1	
Cockatrice		253	..	2	1	..	2	1	
Pigeon		211	..	2	1	..	2	1	
Wizard		201	..	2	1	..	2	1	
Lark		160	..	2	1	..	2	1	
Redwing		161	..	2	1	..	2	1	
Whiting		183	..	2	1	..	2	1	
Fervent		209	..	2	1	..	2	1	
Tyrian		157	..	2	1	..	2	1	
Speedy		218	..	2	1	..	2	1	
Dapper		272	..	2	1	..	2	1	
Earnest		188	..	2	1	..	2	1	
Bruiser		158	..	2	1	..	2	1	
Netley		230	..	2	1	..	2	1	
Orwell		228	..	2	1	..	2	1	
Pheasant		199	..	2	1	..	2	1	
Thrasher		212	..	2	1	..	2	1	
Total .. ..	..	11,458	..	77	34	..	71	43

TROOP SHIPS, STORE SHIPS, &c.

Jumna	800	4,200	1	8	3	1	4	7	
Serapis	800	4,200	1	8	3	1	4	7	
Crocodile	800	4,200	1	8	3	1	4	7	
Malabar	800	4,200	1	8	3	1	4	7	
Euphrates	800	4,200	1	8	3	1	4	7	
Simoom	400	1,576	1	5	1	1	3	3	
Himalaya	700	2,556	1	6	2	1	4	4	
Orontes .. ..	..	2,500	1	5	2	1	4	4	
Tamar	500	1,869	1	5	2	1	4	3	
Assistance .. ..	..	1,300	1	3	2	1	1	4	

Name	Horse Power		Present Complement			Proposed Complement			Remarks
	Nominal	Indicated	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	

TROOP SHIPS, &c.—*Contd.*

Supply	80	265	..	2	..	..	1	3	
Dromedary	180	640	..	3	1	1	1	2	
Fox	200	764	1	2	1	1	1	2	
Valorous	400	1,145	1	3	1	1	1	3	
Wye	130	629	..	3	1	1	1	2	
Salamander	220	506	1	2	1	1	1	2	
Victoria and Albert ..	600	2,980	1	5	..	1	5	..	
Osborne	450	2,700	2	1	3	2	1	3	
Alberta .. ..	..	1,208	1	2	..	1	2	..	
Vigilant	250	1,815	1	3	0	1	1	3	
Helicon	250	1,611	1	3	0	1	1	3	
Lively	250	1,757	1	3	0	1	1	3	
Salamis	250	1,440	1	3	0	1	1	3	
Enchantress	250	1,318	1	3	0	1	1	3	
Total .. ..	..	49,579	22	102	32	24	55	85	

TENDERS, &c.

Vivid	160	832	..	2	1	2	} Harbour Service
Princess Alice.. ..	120	431	..	1	1	..	1	2	
Jackal	150	455	..	2	..	..	1	2
Fire Queen	120	466	..	2	..	..	1	2
Porcupine	132	285	..	1	1	..	1	2	
Sprightly	100	214	..	1	1	..	1	2	
Pigmy	100	178	..	1	1	..	1	2	
Vesuvius .. ..	..	350	..	1	1	..	1	1
Cromer	60	245	..	2	1	..	2	1	
Heron	60	240	..	2	1	..	2	1	
Plucky.. ..	25	224	..	1	1	..	1	1	
Total	3,920	..	16	8	..	13	18	

Engineer Officers, &c., required for Reserves, &c., when ALL Ships are Commissioned.

Duties	Present			Proposed			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	
Dockyards	6	11	..	6	6	5†	{ †5 for Hong Kong
Charge of Divisions, &c. ..	10	10	..	10	10	..	
Fisgard	2	3	..	2	3	..	
Torpedo service	1	1	..	1	1	..	
Foreign and Colonial Governments	4	1	..	4	1	..	
Royal Naval College .. ..	..	30	..	..	30	..	
Half-pay, Sick, and on leave ..	20	44	22	20	32	42	
Supernumeraries on Reserve Flag Ships for general duties of reserve and drafting .. ..	..	76	38	..	50*	64*	See note
	43	176	60	43	133	111	

* This allows 4 Engineers at each Yard for working parties, 2 for superintendence of work, and 11 for drafting and general duties; also 12 Artificers at each Yard constantly for repairs, and 9 for drafting.

No. 2.

**Present and Proposed Complete Complements of
Engineer Officers, &c., for all Ships in *Commission*;
also Numbers required in addition for Dockyards
and Reserves.**

SUMMARY.

Description	Present Complement			Proposed Complement		
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers
Ironclads	25	150	66	25	103	115
Frigates and Corvettes	29	100	52	29	59	92
Sloops	10	57	31	21	30	51
Twin-Screw Gunboats .. ..	..	77	32	27	29	56
Single Screw .. .. .	..	42	12	..	31	26
Tenders	4	48	6	4	26	52
Troop Ships, Royal Yachts, and Home Ships }	15	74	27	16	42	59
Total	83	548	226	122	320	451
Add for Reserve, Half-pay, &c., as given on last page .. }	88	191	61	98	126	127
Grand total	171	739	287	220	446	578

NOTE.—The grand total under “present complement” makes up the total number of each class at present in the Navy.

That under “proposed complement” would be the number required with the proposed scheme under similar circumstances.

Names	Present Complement			Proposed Complement			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	

IRONCLADS.

Devastation	1	10	4	1	6	8	
Invincible	1	6	3	1	5	4	
Iron Duke	1	6	3	1	5	4	
Andacious	1	6	3	1	5	4	
Glatton	1	5	3	1	4	4	
Gorgon	1	2	2	1	2	2	
Penelope	1	6	3	1	4	5	
Sultan	1	9	4	1	5	8	
Hercules	1	9	4	1	5	8	
Monarch	1	8	4	1	5	7	
Warrior	1	8	2	1	5	5	
Achilles	1	8	2	1	5	5	
Black Prince	1	8	2	1	5	5	
Swiftsure	1	5	4	1	4	5	
Triumph	1	5	4	1	4	5	
Bellerophon	1	6	3	1	5	4	
Hector	1	6	2	1	4	4	
Repulse	1	6	2	1	4	4	
Valiant	1	6	2	1	4	4	
Resistance	1	5	2	1	4	3	
Favorite	1	3	1	1	2	3	
Research	1	3	1	1	1	3	
Pallas	1	4	2	1	4	3	
Terror	1	3	1	1	1	3	
Minotaur	1	7	3	1	5	5	
Total	25	150	66	25	103	115	

FRIGATES AND CORVETTES.

Raleigh	1	5	4	1	4	5	
Revenge	1	4	2	1	3	4	Coastguard
Newcastle	1	4	2	1	3	3	
Undaunted	1	4	2	1	3	3	Flag Ship
Doris	1	4	2	1	3	4	
Immortalité	1	4	2	1	3	3	
Topaze	1	4	2	1	3	3	
Aurora	1	3	1	1	1	3	Coastguard
Narcissus	1	3	1	1	1	3	
Active	1	5	2	1	3	4	
Volage	1	5	2	1	3	4	
Thalia	1	3	1	1	1	3	
Pearl	1	3	1	1	1	3	
Challenger	1	4	2	1	1	3	Special Service.
Charybdis	1	3	1	1	1	3	
Amethyst	1	3	2	1	2	3	
Sapphire	1	3	2	1	2	3	
Diamond	1	3	2	1	2	3	
Encounter	1	3	2	1	2	3	
Modeste	1	3	2	1	2	3	
Thetis	1	3	2	1	2	3	
Briton	1	3	2	1	2	3	
Druid	1	3	1	1	1	3	
Blanche	1	3	1	1	1	3	
Dido	1	3	1	1	1	3	
Eclipse	1	2	2	1	1	3	
Tenedos	1	3	2	1	2	3	
Sirius	1	3	2	1	2	3	
Endymion	1	4	2	1	3	2	Coastguard
Total	29	100	52	29	59	92	

Names	Present Complement			Proposed Complement			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	

SLOOPS.

Daphne	1	2	2	1	1	3	
Dryad	1	2	2	1	1	3	
Nymphe	1	2	2	1	1	3	
Vestal	1	2	2	1	1	3	
Reindeer	1	2	1	1	1	2	
Spiteful	1	2	1	1	1	2	
Barracouta	1	3	0	1	1	2	
Argus	1	2	1	1	1	2	
Antelope	1	3	0	1	1	2	
Supply .. .. .	..	2	2	..	1	3	
Alert .. .. .	..	2	..	..	2	..	
Discovery .. .. .	..	2	..	..	2	..	
Rapid .. .. .	..	3	..	1	1	2	
Rosario .. .. .	..	2	1	1	1	2	
Peterel .. .. .	..	2	..	1	1	2	
Albatross .. .. .	..	2	2	1	1	2	
Daring .. .. .	..	2	2	1	1	2	
Egeria .. .. .	..	2	2	1	1	2	
Fantome .. .. .	..	2	2	1	1	2	
Sappho .. .. .	..	2	2	1	1	2	
Flying Fish .. .. .	..	2	2	1	1	2	
Myrmidon	1	2	2	1	1	2	
Arab .. .. .	..	2	1	..	2	1	
Lily .. .. .	..	2	1	..	2	1	
Nassau .. .. .	..	3	1	1	1	2	
Sylvia .. .. .	..	3	..	1	1	2	
Total	10	57	31	21	30	51	

TWIN-SCREW GUN-VESSELS AND GUNBOATS.

Bittern .. .. .	..	3	1	1	1	2	
Curlew .. .. .	..	3	1	1	1	2	
Lapwing .. .. .	..	3	1	1	1	2	
Philomel .. .. .	..	3	1	1	1	2	
Ringdove .. .. .	..	3	1	1	1	2	
Seagull .. .. .	..	3	1	1	1	2	
Swallow .. .. .	..	3	1	1	1	2	
Vulture .. .. .	..	3	1	1	1	2	
Woodlark .. .. .	..	3	1	1	1	2	
Bullfinch .. .. .	..	3	1	1	1	2	
Frolic .. .. .	..	3	1	1	1	2	
Kestrel .. .. .	..	3	1	1	1	2	
Rifleman .. .. .	..	3	1	1	1	2	
Ready .. .. .	..	3	1	1	1	2	
Beacon .. .. .	..	3	1	1	1	2	
Boxer .. .. .	..	2	2	1	1	2	
Cracker .. .. .	..	3	1	1	1	2	
Dwarf .. .. .	..	3	1	1	1	2	
Fly .. .. .	..	3	1	1	1	2	
Hart .. .. .	..	2	1	1	1	2	
Hornet .. .. .	..	3	1	1	1	2	
Lynx .. .. .	..	2	2	1	1	2	
Midge .. .. .	..	3	1	1	1	2	
Pert .. .. .	..	2	2	1	1	2	
Rocket .. .. .	..	2	2	1	1	2	
Thistle .. .. .	..	3	1	1	1	2	
Growler .. .. .	..	2	2	1	1	2	
Comet } 28 H.P.	..	1	..	..	1	1	
Hyæna }	..	1	..	..	1	1	
Total .. .. .	..	77	32	27	29	56	

Names	Present Complement			Proposed Complement			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	
SINGLE-SCREW GUN-VESSELS AND GUNBOATS.							
Dart	3	0	..	1	3	
Nimble	3	0	..	1	3	
Torch	3	0	..	1	3	
Ariel	2	1	..	2	1	
Coquette	3	0	..	2	1	
Decoy	2	1	..	2	1	
Foam	2	1	..	2	1	
Goshawk	2	1	..	2	1	
Merlin	3	..	..	2	1	
Mosquito	2	1	..	2	1	
Swinger	2	1	..	2	1	
Zephyr	2	1	..	2	1	
Contest	2	1	..	2	1	
Cygnets	2	1	..	2	1	
Express	2	1	..	2	1	
Dasher	3	..	..	2	1	
Cockatrice	1	2	..	1	2	
Wizard	3	..	..	1	2	
Total	42	12	..	31	26	

TENDERS.

Fervent .. .. .	..	2	..	..	1	2	
Tyrian .. .. .	..	2	..	..	1	2	
Speedy .. .. .	..	1	..	..	1	2	
Dapper .. .. .	..	2	..	..	1	2	
Earnest .. .. .	..	1	..	..	1	2	
Arrow .. .. .	..	1	1	..	1	1	
Plucky .. .. .	..	1	1	..	1	1	
Bruiser .. .. .	..	1	1	..	1	2	
Vivid .. .. .	..	2	..	..	1	2	
Princess Alice .. .. .	..	1	1	..	1	2	
Jackal .. .. .	..	2	..	..	1	2	
Fire Queen .. .. .	..	2	..	..	1	2	
Netley .. .. .	..	2	..	..	1	2	
Wildfire .. .. .	..	2	..	..	1	2	
Orwell .. .. .	..	3	..	..	1	2	
Pheasant .. .. .	..	2	..	..	1	2	
Flirt .. .. .	..	3	..	1	1	2	
Porcupine .. .. .	..	1	..	..	1	2	
Thrasher (Hector) .. .. .	..	1	..	..	1	2	
Sprightly .. .. .	..	2	..	..	1	2	
Vesuvius .. .. .	..	1	1	..	1	1	
Pigmy .. .. .	..	1	1	..	1	2	
Enchantress	1	3	..	..	1	2	
Vigilant	1	3	0	1	1	3	
Helicon	1	3	0	1	1	3	
Lively	1	3	0	1	1	3	
Total	4	48	6	4	26	52	

TROOP SHIPS, ROYAL YACHTS, STORE SHIPS, &c.

Jumna	1	8	3	1	4	7	
Serapis	1	8	3	1	4	7	
Crocodile	1	8	3	1	4	7	
Malabar	1	8	3	1	4	7	
Euphrates	1	8	3	1	4	7	
Simoom	1	5	1	1	3	3	
Himalaya	1	6	2	1	4	4	

Names	Present Complement			Proposed Complement			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	
TROOP SHIPS, &c.—Contd.							
Duncan	1	4	2	1	3	4	
Aboukir	1	3	1	1	1	3	
Fox	1	2	1	1	1	2	
Valorous	1	3	1	1	1	3	
Wye .. .. .	..	3	1	1	1	2	
Victoria and Albert	1	5	..	1	5	..	
Osborne	2	1	3	2	1	3	
Alberta	1	2	..	1	2	..	
Total	15	74	27	16	42	59	

APPENDIX TO No. 2.

Engineer Officers and Engine-room Artificers in Reserves, &c., and Appointed to Ships not in Commission. October, 1875.

	Present			Proposed			Remarks
	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers	
Dockyards	6	11	..	6	6	5†	† For Hong Kong.
Duties of Reserves	10	10	..	10	10	..	
Torpedo Service	1	1	..	1	1	..	
Fisgard	2	3	..	2	3	..	
Foreign Governments	4	1	..	4	1	..	
General Duties of Reserve, Charge of Ships and Working Parties, and Executing Repairs .. .. .	..	75	61	..			
Half-pay, Sick and on leave ..	29	17	..	25	105*	122*	See note.
Royal Naval College	3	31	..	3			
Appointed to Ships not in Commission	33	42	..	47†	..	..	See note.
Total	88	191	61	98	126	127	

* The proposed numbers have been taken the same proportion of the present numbers as the total proposed numbers are to the present numbers.

† This increased number is on account of the increased number of ships carrying chiefs.

No. 3.**GENERAL SUMMARY.**

**Required Numbers for Peace Establishment of Engineer Officers
and Engine-room Artificers.**

Supposing same Number of Ships in Commission as at present, from No. 2 the total of Proposed Complements for these Ships is :—

	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers
	122	320	451
Proposed Number for Reserve, see No. 2 ..	98	126	127
Peace Establishment. Total	220	446	578

Suppose All Ships in Commission. Then, from No. 1, the Number of Officers and Artificers required will be :—

	Chief Engineers	Engineers and Assistant Engineers	Engine Room Artificers
For Ships	189	561	724
„ Reserves, see No. 1	43	133	111
Total	232	694	835

APPENDIX III.

The Regulations of 1863 that are still in force are embodied in the following extracts from the Regulations relative to the entry and training of Engineer Students in Her Majesty's Dockyards.

Vacancies for Appointments as Engineer Students in the Factories at Chatham, Sheerness, Portsmouth, and Devonport are open to public competition.

The Lists of Candidates for these situations will be kept by the Civil Service Commissioners in London, and the Superintendents of the Dockyards named in paragraph 1, to whom all applications must be addressed before the 1st May in each year. With a view of complying as far as practicable with the wishes of the Candidates as to their distribution among the several Factories, the Candidates in their applications for nomination are to write down the names of the four Factories in order of preference.

Candidates must not be less than Fourteen nor more than Fifteen Years of age on the 1st day of the Examination. Proof of Age will be required by the production of a Certificate of Birth, an Extract from Baptismal Register, or by declaration before a Magistrate. Evidence of respectability and good character must also be produced on a Form which will be furnished by the Civil Service Commissioners, or by the Superintendents of the Dockyards.

Candidates will not be admitted for examination until they have been pronounced fit for Her Majesty's Service by the Medical Officers. Candidates in or near London may be examined by the Medical Director General of the Navy at the Admiralty. All Candidates must produce Certificates to the satisfaction of the examining Medical Officers that they have been re-vaccinated, or they will be re-vaccinated before they can be considered eligible for examination.

The examination will commence on the first Tuesday in June in each year, and will be held by the Civil Service Commissioners in London, as well as at the Dockyards named in paragraph 1.

The following will be the subjects of Examination, and the maximum number of Marks for each subject:—

Arithmetic	250
Orthography	100
Handwriting	100
Grammar	100
English Composition	100
Geography	100
Translation of French into English ..	150
Euclid—First six books	300
Algebra, including quadratic equations ..	300
Total	1500

Candidates will be subjected to a Preliminary Examination in the first three subjects, and should they fail in any of the three they will be at once rejected. Those who pass the Preliminary Test will then undergo a Competitive Examination in the remaining subjects, and the Candidates who display a competent knowledge of all the above subjects, and who obtain not less than 750 marks in the aggregate, will be classed in one general list in order of merit, according to the number of marks gained, and will be eligible for appointment as Engineer Students in the Dockyards in existing Vacancies.

Engineer Students will remain for Six Years at the Dockyards for practical training in the Factory Workshops, and to receive instruction in Iron Shipbuilding. They will also attend the Dockyard Schools for such periods, and to pursue such studies, as may from time to time be determined on: they will also pass a portion of their time in the Drawing Office. Means will be afforded them of acquiring the groundwork of the knowledge required by a Naval Engineer respecting the working of Marine Engines and Boilers,

including those repairs which can be carried out afloat, the practical use of the various Instruments used in the Engine-room, including the Indicator, and of becoming generally acquainted with the duties of a Naval Engineer.

Engineer Students will be examined once a-year under the President of the Royal Naval College, and the Engineer Officers of the Admiralty. The Examination of the Sixth Year Students will include tests of their skill as workmen, and those found qualified will, on the completion of their term of service at the Dockyards, proceed to the Royal Naval College at Greenwich as Acting Second Class Assistant Engineers on the 1st October succeeding the Examination, where they will pass through a course of higher Instruction during one term.

Those Engineer Students who fail to pass the Examination at the end of their Six Years' service, will be allowed to remain one year longer at the Dockyards, and will then be re-examined, when, if they are unable to pass, they will cease to be eligible for the rank of Naval Engineer. The Pay of such Students during this last year of probation will be the same as during their sixth year.

Engineer Students will not be entered as Acting Second Class Assistant Engineers until they have been pronounced fit for Her Majesty's Service by the Medical Officers, and have learned to swim.

The term for study at Greenwich will be from the 1st October to the 30th June following. All will be examined under the President of the Royal Naval College on the completion of their term at Greenwich, and will receive Certificates according to their merit in three classes. Those taking the First Class Certificate will be granted twelve months, the Second Class six months' additional time to count for promotion; those taking the Third Class Certificate will only count the same since they passed out of the Dockyards.

Acting Second Class Assistant Engineers will receive 3s. 6d. a-day, and 1s. 6d. a-day towards the mess during their first Term of study at Greenwich. If selected for further study during one or more Terms they will receive their full pay of 6s. a-day, and 1s. 6d. a-day towards the mess.

Two Acting Second Class Assistant Engineers will be selected from those who take the highest place at the Examination on the completion of their term at Greenwich, to pass through a further course of scientific instruction if they desire it. These two will be allowed to remain a third term at Greenwich, on the completion of which they will be sent to Sea as Assistant Engineers, and after one year's service at Sea, they will be considered eligible to fill positions in the Dockyards and at the Admiralty.

Those passing the Second and Third term at Greenwich will be attached during the vacations, between the 30th June and 1st October, to the Dockyards or Steam Reserves, where they will attend trials of new and repaired Engines, and obtain experience respecting the duties they will have to perform at Sea.

No Assistant Engineer who has passed Three Terms at Greenwich will be allowed to leave Her Majesty's Service within seven years of the completion of his term at Greenwich, unless he shall pay the sum of £250 to defray the charges of his education.

All time at Greenwich will count as Sea time.

The weekly pay of Engineer Students while employed in the Dockyards will be 8s. during the first year of their training, and if they are reported on favourably by the Officers, it will be increased 2s. a-week each year until the sixth, and then increased 8s., making their wages 24s. a-week for the last year.

The Acting Second Class Assistant Engineers during their term of study at Greenwich will be lodged, and will receive 1s. 6d. a-day towards their mess expenses, and in addition they will receive pay at the rate of 3s. 6d. a-day. Those selected for further study during one or more terms will receive pay at the rate of 6s. a-day, and 1s. 6d. a-day towards their mess expenses.

N.B.—The above Regulations will be generally followed, but their Lordships reserve to themselves the right to modify them from time to time as they may consider desirable.

When the Engineer Students already in the Service are qualified for and promoted to the rank of Acting Second Class Assistant Engineer, they will receive full pay during their course of study, whether at Greenwich or at the Dockyards, viz., 6s. a-day, and 1s. 6d. a-day towards the mess.

APPENDIX IV.

ADMIRALTY,
13th May, 1873.

Reports having been received that some of the Engineer Students, trained in the Dockyards, have been found deficient in practical acquirements, my Lords Commissioners of the Admiralty, with the view of improving the Students generally in this respect, are pleased to issue the following directions—

2. During the first three years of their service Engineer Students are to be employed in the Fitting and Machine Shops, about one-half of this time they are to be employed at the vice and the other half at the several kinds of machines.

3. During the fourth year they are to be employed for about three months in the Coppersmith's Shop, three months in the Iron and Brass Foundries, three months in the Boiler Shop and Engine and Boiler Smitheries, and the remainder of the time in the Erecting Shop.

4. During the fifth year they are to be employed about six months in the Erecting Shop, and about six months on the Hulls of Iron Ships, to gain a knowledge of the method of constructing them, and of the arrangements relating to Water-tight Compartments, Pumps, &c.

5. During the sixth year they are to be principally employed on the repair of the machinery of ships afloat; they are to be allowed to attend the trials of engines to gain some knowledge of the special duties of a Naval Engineer, and of the practical use of the various instruments used in the Engine Room. They may be employed for about three months in the Drawing Office in this year if convenient.

6. It is not expected that the time spent in the Coppersmith's Shop, the Foundries, the Boiler Shop, and the Smitheries will enable the Students to become expert at the several trades carried on in them, but it is expected that they will be able to perform such repairs to piping as can be done on board ship, to mould and cast small articles, such as stop valves, feed cocks, &c., to perform the simpler operations of forging, and to acquire a practical knowledge of the method of constructing and staying boilers, and of repairing them.

7. In passing the Students through the several workshops it is to be understood that they are to be distributed in such numbers, at various times, and to be employed on such pieces of work, as will be most conducive to the general efficiency of the several departments.

8. During the first three years the Engineer Students are to attend the Dockyard Schools on two afternoons and three evenings each week. During the fourth year they are to attend the schools for two afternoons as before, but on the three evenings they are to attend drawing classes, where they will be taught mechanical drawing under the superintendence of the Leading Draughtsman. During the fifth and sixth years they are to attend the schools during the three evenings each week, but they are not to attend the schools in the afternoons, as the whole time during the working hours of the Yard is to be given to practical duties.

9. A competent Leading Man is to be appointed for each Factory, whose duty it will be, under the Officers and the Leading Men of Shops, to superintend the practical training of the Engineer Students. He is to see that they are kept fully employed on suitable work, and that they are taught how to do their work in the several trades. He is to keep a record of the time spent by each Student at the several trades, and is to report weekly all cases of idleness and misconduct to the Chief Engineer, who will forward them with his remarks to the Superintendent.

10. The Chief Engineer and the Officers of the Factory are to take frequent opportunities of ascertaining personally if the Students are properly instructed and making satisfactory progress.

11. The Engineer Students will be examined by the Engineer Officers at the Admiralty, at the end of the fourth, fifth, and sixth years of their service, as to their practical acquirements and knowledge of Steam Machinery, and in addition, the Students who are completing the sixth year of their service will be examined by the Chief Engineer of the Dockyard, the Inspector of Machinery of the Reserve, and a Chief Engineer, R.N., in the presence of the Captain of the Steam Reserve, as to their ability

as workmen at the several trades of the Factory, on the practical use of the various instruments employed in the Engine Room, and on the duties generally of a Naval Engineer, and no one will be entered as an Acting Second Class Assistant Engineer until the Examining Officers have certified that by his skill as a workman, his knowledge of Steam Machinery and his good and steady conduct he is fully qualified for the appointment.

By Command of their Lordships,

ROBERT HALL.

*To the Superintendents,
at the several Dockyards.*

APPENDIX V.

Form H.—No. 485.

This INDENTURE made the _____ day of _____ between*
 of 14 years and upwards) of the first part†

of the second part and‡

(for and on
 behalf of the Queen's Most Excellent Majesty Her Heirs and Successors) of
 the third part

Witnesseth that in consideration of the covenants and agreements of the said third mentioned party on behalf of Her Majesty Her Heirs and Successors hereinafter contained the said first mentioned party (with the consent and approbation of the said second mentioned party testified by his being a party hereto) doth by these presents freely and voluntarily put and place himself Apprentice to the said third mentioned party to learn and practise the art or occupation of Naval Engineering in the several branches or departments thereof in which such Apprentices are or shall or may be employed in Her Majesty's Dockyard at _____ or other Home Yard or other places as may at any time or times during the term of his Apprenticeship be decided by the Commissioners for executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland (hereinafter called "the Commissioners") and for those purposes to serve after the manner of an Apprentice with and under the said third mentioned party or the person who may be appointed to do his duty as hereinafter mentioned for the use and benefit of Her said Majesty Her Heirs and Successors for and during and unto the end of the full term of Six years to be computed from the day of the date hereof comprising the period of his service in the Dockyard or Yards or other places as aforesaid And the said first and second mentioned parties do severally hereby covenant promise and agree with and to the said third mentioned party (in trust for and for the benefit of Her said Majesty Her Heirs and Successors) that the said Apprentice shall and will from time to time and at all times during the said term most faithfully and industriously serve and obey his said Master or the person appointed to do his said Master's duty whilst the said Apprentice shall be serving in the Dockyard in all their respective lawful commands orders and directions and do perform and execute all such work labour and services as they respectively shall order or direct and generally shall and will at all times and upon all occasions diligently conduct and employ himself and use and exert his best abilities and endeavours towards his improvement and perfection in the said art of Naval Engineering and for the good and benefit of Her said Majesty Her Heirs and Successors therein And also that he the said Apprentice shall not nor will at any time during the said term do or willingly suffer to be done any act deed matter or thing whatsoever whereby the goods effects officers or service of Her said Majesty Her Heirs or Successors can shall or may in anywise be embezzled injured defrauded or otherwise prejudiced in any manner howsoever nor shall nor will at any time absent himself from his service or work without the leave of his said Master or any officer under whose authority he may be placed nor contract marriage during the period of this Indenture nor be guilty by word or action of any immoral indecent irregular or improper conduct or behaviour in any respect whatsoever but shall and will demean himself at all times with strict propriety and submission to his superiors And further that in the event of the death of the said third mentioned party or of his successor for the time being as hereinafter mentioned or of the removal from his office of the said third mentioned party or such his successors for the time being at any time or times before the expiration of the said term of six years he the said Apprentice shall and will from thenceforth faithfully and industriously serve and obey in all things as an Apprentice as aforesaid whilst employed in the Dockyard the person who shall hold the said office or shall be appointed from time to time the successor or to do the duty of the said third mentioned party for

* Name of Apprentice.

† Father, Guardian, or next friend of the Apprentice.

‡ Chief Engineer or other Officer to whom the Apprentice is to be bound.

the time being for and during the remainder which at the time of each such death or removal as aforesaid shall be to come of the said term of Six years in the same manner in every respect as if such person had been named herein instead of the said third mentioned party And in consideration of all and singular the premises the said third mentioned party doth hereby for and on behalf of Her said Majesty Her Heirs and Successors covenant promise and agree with and to the said first and second mentioned parties and each of them that he the said Apprentice duly observing performing and keeping all the covenants and agreements on his part hereinbefore contained shall be properly taught and fully instructed in the said art or occupation of Naval Engineering And the said second mentioned party doth hereby promise and agree to and with the said third mentioned party that he the said second mentioned party shall and will from time to time during the said term find and provide for the said Apprentice good and sufficient board lodging clothing and washing and all other necessaries proper for his personal accommodation and benefit suitable to his said intended situation and also all such implements working tools and instruments as shall be requisite to enable him to learn and practise the said art or occupation of Naval Engineering And further in consideration of the said Apprentice complying with this condition and only so long as he shall so do to the complete and entire satisfaction of the said third mentioned party or his successor or the person doing the duty of the said third mentioned party for the time being and also in consideration of the services of the said Apprentice the said Apprentice shall during such time as he shall continue at his work receive and be entitled to all the wages emoluments and advantages which the said Commissioners shall from time to time think proper to establish and allow to Apprentices of his description Provided always that he the said Apprentice during the continuance of this Indenture shall be subject to and will obey all rules and regulations which are or shall be from time to time made and established by the said Commissioners in respect to Apprentices And whereas the first mentioned party hereby further promises and agrees to and with the said third mentioned party that he the said first mentioned party shall and will at or before the expiration of the said term of six years present himself at and do his best and utmost to pass such examination or examinations as under the regulations in that behalf for the time being in force he shall be required to present himself at and that he will do his best and utmost to obtain a certificate of fitness to enter the Naval Service of Her Majesty as an Assistant Engineer Provided always and it is hereby agreed and declared that if at or before the expiration of the said term of six years the said first mentioned party shall not obtain such certificate of fitness to enter Her Majesty's Naval Service as an Assistant Engineer as aforesaid then and in such case that the said term of six years hereinbefore limited for his Apprenticeship in the Dockyard to learn the art or occupation of Naval Engineering shall be extended to the term of seven years and that all and every the covenants agreements and provisions hereinbefore contained shall be deemed to be and shall be applicable to the said extended term as fully and effectually as if the said original Apprenticeship hereunder had been for the term of seven years instead of for the term of six years as hereinbefore provided And it is hereby further agreed and declared that it shall be lawful for the said Commissioners at any time during the said term of six years or the said extended term of seven years for any cause which to them the said Commissioners shall deem sufficient either for any neglect of the work required from the said first mentioned party (not arising from any disability through accident or sickness) or any misconduct on the part of the said first mentioned party or in the discretion of the said Commissioners having regard to the requirements of the public service to direct the said third mentioned party or the person who may be appointed to do his duty to give notice in writing to the said second mentioned party his executors or administrators that the said first mentioned party has been discharged from his said Apprenticeship hereunder and that this Indenture shall be void and that from and after the giving of such notice as aforesaid to the second mentioned party his executors or administrators or if he or they cannot be found the affixing of such notice publicly in the office of the Cashier and also in front of the Muster offices of the said Yard this Indenture and everything hereinbefore contained shall cease and determine and be utterly void to all intents and purposes.

In witness whereof the parties to these presents have hereunto subscribed their names and affixed their seals the day and year first above written.

Signed Sealed and delivered by }
 all the parties (being first duly }
 stamped) in the presence of }

Form H.—No. 486.

Know all Men, by these presents, that
 who has been admitted as an Apprentice to
 at Her Majesty's Dockyard at _____ in the county
 of _____ for the purpose of learning and practising the
 art or occupation of Naval Engineering, and
 of _____
 are held and firmly bound to our Sovereign Lady the Queen, Her Heirs and
 Successors, in the sum of £100, for which payment to be duly made we the said
 and _____
 do hereby bind ourselves, and each of us, our and each of our heirs, executors,
 and administrators, by these presents. Sealed with our seals this
 day of _____ 187 .

Whereas the above bounden
 has this day become an Apprentice to
 at Her Majesty's Dockyard at _____ in the county of
 for the purpose of learning and practising the art or occupation of Naval Engineering, for
 a term of six years, to be extended to seven years in case the said

should not at the expiration of the said term of six years obtain a certificate of fitness
 to enter Her Majesty's Naval Service as an Assistant Engineer.

Now the condition of the above written obligation is such, that if the said
 shall at the expiration of the said term of six years or of the said term of seven years,
 as the case may be (unless previously discharged under the terms of the Indenture of his
 Apprenticeship), duly obtain a certificate of his fitness to enter Her Majesty's Naval
 Service as an Assistant Engineer, and shall enter into Her Majesty's Naval Service as
 such if required so to do, then the above written obligation shall be void, otherwise the
 same shall continue in full force and effect.

In witness whereof, the parties to these presents have hereunto subscribed their
 names and affixed their seals the day and year first above written.

Signed, Sealed, and delivered by }
 all the Parties (being first duly
 stamped) in the presence of }

APPENDIX VI.

H.—No. 294.

*Candidate for admission in H.M.**at**as**

[To be filled up by the Candidate in his own handwriting.]

NOTE.—Should any of the particulars furnished, in answer to the undermentioned queries, be found to be false, the nomination of the Candidate will be liable to be cancelled; or should the Nominee have been appointed to the Yard or Factory he will be liable to be dismissed.

Christian Name and Surname in full	
Usual Signature and Date	
Usual Address	
Birth-day (state the Day, Month, and Year)	
Age on last Birth-day	
Place of Birth	
Father's Name	
Father's Residence	
Father's Profession or Trade	
(If deceased, give the last residence, profession, &c.)	
<i>Schools.</i>	
Mention the School or Schools at which you were educated, stating the kinds of Schools, whether Public or Private, Collegiate, National, British, &c.....	
Mention the length of your stay in each, and the Name of the Master of the School last attended.....	
Age on finally quitting School	
Referees to Character	
Mention the Names and Addresses of two responsible persons who are well acquainted with you in private life..	

* Engineer Student, or Dockyard or Victualling Yard Apprentice.

APPENDIX VII.

Extracts from the Regulations relative to the Entry, Qualifications, &c., of the Engine-room Artificers.*Qualifications.*

A Candidate for the rating of Engine-room Artificer must be either an Engine-fitter, a Boilermaker, a Smith, or a Coppersmith.

As an exception to this rule, in the Home Ports a Pattern-maker may occasionally be received.

His age must not be less than 21, or more than 35 years.

He must be able to read and write sufficiently well to be competent to note in the log the particulars of the working of engines and boilers; and he must be generally acquainted with the names and uses of the principal parts of a marine engine.

He must undergo an examination by the Chief Engineer of the Dockyard and the Inspector of Machinery afloat, in the presence of the Captain of the Reserve; and if the Candidate appears to be qualified, he is, in the first instance, to be appointed as acting.

He is not to be confirmed until he has served 12 months, and he has passed an examination: if at home, by a Chief Engineer of a Dockyard and an Inspector of Machinery afloat, in the presence of the Captain of the Steam Reserve; or, if abroad, by an Inspector of Machinery afloat, or if there is no Inspector of Machinery afloat, by two Chief Engineers, in the presence of the Captain of the ship in which the Engine-room Artificer may be serving.

He must understand the uses and management of the various gauges—of the feed, injection, and blow-off cocks; he must know how to ascertain the density and height of the water in the boilers, and what should be done in the event of priming.

He must also know how to regulate the water admitted for condensation; what should be done in the event of water passing into the cylinders; or of a bearing becoming heated; and how to act on the occurrence of any of the ordinary casualties of an engine-room.

He must also obtain a Certificate from his Captain that he is fit to keep a watch in the engine-room, and is deserving of confirmation.

Pay.

The pay of an Engine-room Artificer to be—

5s. a-day for the first 3 years;

5s. 9d. a-day afterwards.

While acting the pay is to be the same as after confirmation, and, if confirmed, acting time to be allowed.

Rank.

To be that of a Chief Petty Officer—in the place of the present Chief Stoker, which rating will now be abolished.

Mess.

To mess with Master-at-Arms and other Chief Petty Officers.

Pensions.

As Chief Petty Officers.

General.

All Engine-room Artificers must enter for continuous service.

Entries to be made by the Commanders-in-Chief at the Ports, and confirmations to be made either at home or abroad, by the Commander-in-Chief, or Senior Officer.

By Command of their Lordships,

HENRY G. LENNOX.

ENGINEER OFFICERS' NUMBERS ON ACTIVE LIST, FROM MARCH, 1868, TO DECEMBER, 1875.

APPENDIX.

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	1868.				1869.				1870.				1871.			
	March	June	Sept.	Dec.	March	June	Sept.	Dec.	March	June	Sept.	Dec.	March	June	Sept.	Dec.
Chief and Inspectors of Machinery Afloat	14	14	15	14	14	13	13	12	12	8	10	10	10	10	10	10
Chief Engineers	238	238	231	228	227	221	220	219	217	170	169	170	170	170	170	170
Engineers for Special Charge ..	9	9	9	9	9	9	8	8	8	8	2	2	2	2	2	2
Engineers	629	651	635	707	719	730	737	733	742	725	637	657	657	658	657	649
First-class Assistant Engineers ..	273	242	218	199	178	162	154	143	125	123	128	90	83	90	83	78
Second-class Assistant Engineers	84	83	75	73	70	74	69	69	68	58	58	53	63	55	63	62
Total	1,242	1,232	1,233	1,230	1,217	1,209	1,201	1,184	1,172	1,092	1,004	984	988	985	985	971
Engineer Officers for Temporary Service	23	23	22	15	11	11	11	11	11	11	11	11	11	6	6	5
	1872.				1873.				1874.				1875.			
Chief and Inspectors of Machinery Afloat	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10
Chief Engineers	170	170	169	170	170	170	170	170	170	172	172	172	171	171	171	170
Engineers for Special Charge ..	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
Engineers	648	641	636	636	637	640	636	633	630	626	618	616	611	605	594	593
First-class Assistant Engineers ..	74	72	73	70	67	60	58	60	55	55	55	53	56	60	67	72
Second-class Assistant Engineers	72	73	76	75	83	79	105	101	99	86	96	93	83	69	77	69
Total	971	968	966	963	969	961	980	975	965	949	952	945	932	916	920	915
Engineer Officers for Temporary Service	5	5	5	5	5	4	4	3	3	2	2	2	2	2	2	2

31 December, 1875.

APPENDIX IX.

STATEMENT OF THE ENGINEER OFFICERS OF THE ROYAL NAVY,
FORWARDED TO THEIR LORDSHIPS IN 1872.*Relative Rank and Junior Service.*

By Admiralty Circular, dated 27th February, 1847, the relative rank of Second Master, now Navigating Sub-Lieutenant, was given to all classes of Assistant Engineers, and the privileges of commissioned officers conceded; as for example, all time served as Assistant Engineer was allowed to count in granting pensions to the Widows of Junior Chief Engineers, having less than ten years' service in that rank. But, by the Circular dated 7th May, 1861, all First and Second Class Assistant Engineers (formerly called Second and Third Class Assistant Engineers) were deprived of their relative rank, and reduced to that of Midshipman, whereby a great and lasting injury was done to those officers whose ages ranged from twenty-one to thirty years; as they were thus made junior in rank to other officers of much less service, and of eight to twelve years' less age. The evils arising from this reduction in relative rank, culminated in the Circular of the 2nd March, 1870, by which no time served as Second or Third Assistant Engineer is allowed to count for increase of Full, Half, or Retired Pay, for Chief Engineers and Inspectors of Machinery. Thus a heavy loss is inflicted on them of life-long duration; which is not experienced by officers of any other branch of the Service; for while Chief Engineers and Inspectors of Machinery can only, at the earliest, count their services from twenty-five years of age, Executive and Navigating Officers count all time served as Sub-Lieutenant, or from the age of nineteen, and Paymasters count all time served as Assistant Paymaster, or from the age of twenty-one.

Promotion and Pay.

With regard to the prospect of promotion and increased pay, the Engineers have to complain that they are now worse off than ever. The amount of pay in the junior ranks was not the consideration that induced the majority of Engineers to enter the Service, but the hope of promotion, with the accompanying position, and higher rates of Full and Half Pay. Promotion to the rank of Chief Engineer was possible, and frequently accomplished, after eight years' service in all ranks; but at present Engineers have to serve considerably more than double that length of time before being promoted, and in consequence of the great reduction in the maximum number of Chief Engineers and Inspectors of Machinery, even this long period of junior service is continually increasing, so that no more than 25 per cent. of the Engineers will be able to attain the rank of Chief Engineer, or obtain the privileges of Ward-room Officers. But even those who may be fortunate enough to be promoted, will be at least from forty-five to fifty years of age; hence it will be impossible for them to serve eleven years as Chief Engineers, to entitle them to count their junior service for increase of Full, Half, and Retired Pay. As regards pay, the Engineers feel it to be a great hardship that, although the pay of all other classes of officers has been very much advanced during the last few years, no corresponding increase has been granted to the Engineers, although their duties and responsibilities have been enormously extended. Yet, notwithstanding this, and the high standard of scientific knowledge they have to attain to pass the required examinations, the pay of the Junior Engineers, i.e., Second Assistants, has been increased only two-pence per diem during the last twenty years.

Pensions to Engineers.

The Engineers deeply regret that, instead of a suitable scale of Retired Pay having been assigned them, the same as other commissioned officers, a very insufficient rate of pension was given, which fails to compensate them for the loss of the prospect of promotion, or to recompense them for long, faithful, and arduous service of the greatest responsibility.

Messing and Cabin Accommodation.

In consequence of the excessive extension of the time Engineers have to serve before being promoted, and the great reduction in the number of Engineers on board all classes of ships, especially the smaller ones, an alteration in the present system of separate messing, and the provision of cabin accommodation are felt to be highly necessary. In ships where there is no gun-room, as in troopships, sloops, and others, the difference of position between the Engineers and the most Junior Officers of other ranks, is felt to be a great hardship.

SUGGESTIONS.

Relative Rank.

(1.) That the ranks of First and Second Class Assistant Engineer be abolished; the rank of Engineer only to be retained below that of Chief Engineer; Assistant Engineers now in the Service to receive commissions as Engineers. (2.) That the ranks of Chief Inspector of Machinery Afloat, and Inspector of Machinery Afloat, be merged into that of Inspector-General of Marine Engineering Afloat. (3.) That the following scale of relative rank be substituted for that now in force :—

Denomination of Engineer Officer.	Relative Naval Rank.
Engineer on entry, and under Eight years' service in all existing, or formerly existing ranks ..	Sub-Lieutenant.
Engineer, over Eight years' service in all ranks ..	Lieutenant under Eight years' Seniority.
Chief Engineer, under Twenty years' service in all ranks	Lieutenant over Eight years' Seniority.
Chief Engineer, over Twenty years' service in all ranks	Commander.
Inspector-General of Marine Engineering Afloat ..	Captain.

Messing and Cabin Accommodation.

1. That Engineers' mess berths be abolished in all ships; Engineers under Eight years' service in all ranks to mess in the Gun-room; Engineers over Eight years' service in all ranks to mess in the Ward-room. By this means a sum of about twelve thousand pounds per annum would be saved in servants' pay and provisions, mess-traps, lights, &c. 2. That the space now occupied by the Engineers' mess berths and Stewards' pantries, be appropriated to cabins for the Engineers; no other officers requiring cabin accommodation so much as they do, from their having so often to keep watch for lengthened periods.

Promotion, Retirement, and Method of Counting Junior Service.

1. To allow of a greater range and flow of promotion, and to meet the necessary requirements of the Service, it is proposed that the number of Inspectors-General of Marine Engineering Afloat, and Chief Engineers, be increased to two hundred, and that the number of Engineers be largely reduced. 2. That all time served as First and Second Engineer, prior to the 22nd of February, 1847, and all time served as Engineer, and First, Second, and Third Assistant Engineer, subsequent to that date, together with all acting time, be permitted to count for increase of Full, Half, and Retired Pay, without reference to length of service in the senior ranks. 3. That in lieu of Pensions to Engineers, Retired Pay be allowed them at the rate of sixpence per diem for every year served, the maximum not to exceed eleven shillings per diem. 4. Engineers to be permitted to retire at forty years of age, and to be compulsorily retired at the age of forty-five.

Full and Half Pay.

That the following rates of Full and Half Pay be substituted for those now in force :—

FULL PAY, Per Diem.

	£	s.	d.
Engineer on entry, and under Five years' total service in all existing, or formerly existing, ranks. . .	0	9	0
Engineer over Five and under Eight ditto ..	0	10	6
„ „ Eight „ Eleven ditto ..	0	12	0
„ „ Eleven „ Fourteen ditto ..	0	13	0
„ „ Fourteen „ Seventeen ditto ..	0	14	0
„ „ Seventeen years' total service in all ranks	0	15	0
Chief Engineer, on promotion, and under seventeen years' service in all ranks	0	18	0
And for every additional year of service, one shilling and sixpence a-day more, until the maximum is reached, viz.	1	13	0
Inspectors-General of Marine Engineering Afloat, on promotion	1	18	0
And for every additional year of service, one shilling and sixpence a-day more, until the maximum is reached, viz.	2	10	0

HALF PAY, Per Diem.

Engineer under Five years' total service in all ranks ..	0	4	0
„ over Five and under Eight ditto ..	0	5	0
„ over Eight „ Eleven ditto ..	0	6	0
„ over Eleven „ Fourteen ditto ..	0	7	0
„ over Fourteen „ Seventeen ditto ..	0	8	0
„ over Seventeen years' total service in all ranks	0	9	0
Chief Engineer, under Seventeen years' service in all ranks	0	10	6
„ „ over Seventeen and under Twenty ditto	0	12	0
„ „ over Twenty and under Twenty-five ditto	0	14	0
„ „ over Twenty-five years in all ranks ..	0	16	0
Inspector-General of Marine Engineering Afloat ..	1	0	0

Entry of Engineer Officers.

In order to secure the highest engineering talent for the Navy, it is proposed that entry should be by competitive examination, between advanced Dockyard Students and carefully-selected candidates from the most eminent Engineering Firms in the country. Thus, whilst the present system of entering Students in the Dockyards would be retained, a wholesome emulation would be created which does not now exist, and appointments would be opened to residents in all parts of the country, which are now only practically available for inhabitants in the Naval Ports.

November, 1871.

APPENDIX X.

A PROPOSAL HAVING FOR ITS OBJECT THE INCREASE OF MECHANICAL SKILL AMONG THE JUNIOR ENGINEER OFFICERS OF HER MAJESTY'S NAVY.

"Vigilant," at Shanghai,
18th October, 1875.

SIR,

I have long been of opinion that it would be well to give more encouragement to the Engineer Students and the Junior Engineers of the Navy, to perfect themselves in all branches of their profession, but more particularly in the mechanical part. I have sought the opinions of Engineers of experience, and now submit for the consideration of the Lords Commissioners of the Admiralty what would, I believe, be an important change, attended with small expense and productive of great benefit.

2. It appears that an alteration took place in the curriculum of study in or about the year 1873, and the course was divided as follows :—

Year.	Factory.	Time.					
		Duration.	How passed.				
1862	Keyham	5 years	{	Fitting and Erecting Shops	4	0	
				Drawing Office	0	6	
				Smithery	0	2	
				Foundry	0	2	
				Coppersmith's Shop	0	2	
				Total	5	0	
1873	Keyham	6 years	{	Fitting and Turning	3	0	
				Erecting	0	3	
				On board Ship	0	9	
				Drawing Office	0	6	
				Smithery	0	5	
				Foundry	0	4	
				Pattern Making	0	6	
				Coppersmith's Shop	0	3	
			Total	6	0		

3. This change was a great improvement on the previous programme, as one more year is spent in the Factory ; but the time spent in each branch, though sufficient to gain a general insight, is too short to enable the Student, after joining his sea-going ship, to undertake a job if at all out of the usual run ; and this should be a desideratum, as he has not now, as heretofore, the accumulative experience which was gained by each Engineer afloat before the Artificer class was created, when he had to do every job himself.

4. Proposal.

I. Age of entry into Factory, 13 to 14.

II. Time under instruction, seven years.

III. The numbers at examination for mechanical skill should be obtained partly by mechanical work done in the presence of one of the Examiners, viz., the Captain of the Steam Reserve and the Inspector of Machinery, and partly by record of mechanical work done in the Factory, with certified specimens.

IV. The full numbers for mechanical work should be the half of full numbers in all subjects.

The Secretary of the Admiralty.

V. There should be examinations in mechanical skill at the end of the third, fourth, fifth, sixth, and seventh years.

VI. After the mechanical examination, which should take place before the Indian Troopships commence their trips, the Candidates should make a voyage out and home in one of those ships.

NOTE.—In 1873, 36 Second-class Assistant Engineers appear to have entered. Four Troopships make two trips each. This would allow of four Engineer Students being sent out on each trip.

VII. On their return their examination should take place in Marine Engineering.

VIII. If successful the Candidate should then, and then only, be appointed to Greenwich to study the third subject.

IX. On leaving the College, the Officers should be confirmed as Second-class Assistant Engineers.

X. High certificates at the final examination should carry the following advantages, marked *b, c, d* :—

a. There should be a notation in the Navy List of the three Classes obtained (as in the case of Sub-Lieutenants), the subjects to be—

1. Mechanical Engineering.
2. Marine Engineering.
3. Theoretical knowledge.

b. Additional pay (as in the case of Gunnery Lieutenants), viz. :—

1s. per day for Certificates 2. 2. 2. to 1. 1. 2. Classes, inclusive ;

1s. 6d. per day for Certificates 1. 1. 1. Classes ;

as long as they are *Assistant Engineers*.

c. The possessor of three First-class Certificates to be promoted to the rank of *Engineer* at the end of the first year of *sea service* in a sea-going ship.

The possessor of 1. 1. 2. to be promoted to *First-class Assistant Engineer* at the end of a year of *sea service* in a sea-going ship.

d. No Second-class Assistant Engineer with a Third-class Certificate in either of the three subjects to be promoted to a First-class Assistant Engineer while there is any Second-class Assistant with a 1. 1. 1. or 1. 1. 2. on the list ; and no First-class Assistant to be promoted to Engineer who has only a Third-class Certificate, while there are any on their list with a 1. 1. 1. or 1. 1. 2., provided that in each case these high certificated Officers are eligible for promotion by character and conduct, and also that this regulation shall not have the effect of detaining an Officer on either of the lists of Second or First-class Assistants for more than four years, or such other time as the Admiralty may from time to time direct.

XI. The following list of practical jobs should all be carried out by the Student, record of the fact being entered in a log to be kept by the Student, to which the Leading Man of the Shop should attach his signature weekly, with remarks upon how the work was performed ; this log to be produced to the Examiners.

1. *Fitting.*

Fit up a connecting rod for a capstan or auxiliary engine complete.

Fit up a 2-inch cock with a spanner complete.

Fit up a set of stocks and dies ($\frac{3}{8}$ -inch to $1\frac{1}{2}$ -inch) with taps and wrenches complete.

Refit the surfaces of a leaky seating and valve of a safety valve box, 6-inch valve, seating 16 inches below the cover.

2. *Smithery.*

Weld two pieces of $1\frac{1}{2}$ -inch round bar.

Weld two pieces of $1\frac{1}{2}$ -inch flat bar.

(The above jobs to be tested to breaking strain by hydraulic pressure).

Forge the work that requires to be fitted in Class 1.

Temper the taps and dies, &c., when finished.

Make and temper all tools required for work performed in Class 1.

3. *Foundry.*

Perform all the requisite detail of moulding, and cast the brasses, shell, plug, &c., required in Class 1.

4. *Pattern Shop.*

Make the patterns required for moulding the brass castings of Class 3.

5. *Coppersmithing.*

Make a piece of 2-inch copper pipe, braze on the flanges, and bend it to any sweep given; join it to the 2-inch cock, and test it to 60 lbs. pressure.

Retube a leaky distilling condenser for a small vessel.

Make and braze a patch on an elbow of a leaky steam pipe.

Tin a patch on a cold water pipe.

6. *Boilermaking.*

Partially tube a boiler, 2½-inch brass tubes.

Put a screw patch on any curved portion of a boiler.

Partially tube a superheater, 3-inch iron tubes.

Rivet a patch on a furnace crown.

Bend an angle-iron for a portion of a furnace mouth.

Bend a ¾-inch plate to any shape given.

XII. Any Engineer possessing a 1. 1. 1. Certificate, after qualifying for Chief Engineer, to be eligible for a second course at the Royal Naval College, and, if he passes a First-class Examination, be promoted to Chief Engineer.

XIII. Chief Engineers who have taken a 1. 1. 1. or 1. 1. 2. to be eligible for civil appointments in the Dockyard or at the Admiralty.

XIV. Assistant Engineers and Engineers, and Chief Engineers, employed on shore, to take their turn of sea service.

I have the honor to be,

SIR,

Your obedient Servant,

A. P. RYDER, *Vice-Admiral,*
Commander-in-Chief.

APPENDIX XI.

I BEG to submit the following opinion, with reference to the number of Engine-room Artificers borne in the complement of a ship of this class, of the Mess Accommodation which should be provided, and of the pay of Engine-room Artificers generally :—

1. The Engine Room Staff in this ship consists of seven Engineers, and two Engine-room Artificers, but from my two years' experience, I have formed a decided opinion that it would be more efficient if it consisted of five Engineers, and four Engine-room Artificers. To keep the machinery and boilers in repair, there is always work for the Engineers, and Engine-room Artificers, and much of it is of a nature that cannot be entrusted to an unskilled man. Much of this work will be of a dirty kind, and the junior Engineers do not take to the manual labour as they did a few years ago, especially that of this description. The division of the trades should not be lost sight of; in this ship I should prefer two Fitters, one Boilermaker, and one Coppersmith, good workmen at their respective trades. Men with *fair* abilities as workmen are generally found amongst the Stokers, more especially Blacksmiths and Boilermakers, since the rating of Stoker Mechanic has been established.

2. With reference to Mess Accommodation, I think it will be found that owing to these men having been accustomed to return home from their work and find their meals prepared for them by their wives, &c., they find the change on entering the service very great. On board a ship they have to do more for themselves in the way of preparing and cooking their own meals, and a thing which they dislike very much, is having to clean their own mess places, not having been used to do such work, and I submit if it would not be an economy to have men (whose labour and time is less expensive) to perform this work for them, I also think that it would be advisable for them to have a separate wash-place from the Stokers, as it would be for the good of the Service that they should be kept as distinct as possible from the Stokers, in order that they may the more strictly carry out their duties.

3. The pay of Engine-room Artificers, should be increased at certain periods after the increase given after three years' service, as it would be an inducement to them to re-engage for continuous service. At present, I have no doubt that many of these men will look out for situations in the Merchant Marine, at the expiration of their first engagement, in the hope of obtaining better pay and more comfortable accommodation.

FRAS. C. ALTON,
Chief Engineer.

Captain R. Wells.

Having discussed the matter with Mr. Alton, I quite agree with the above. Five Engineers would be sufficient for this ship. The one next to Mr. Alton does the same duty as the first Lieutenant of a ship, three keep watch, and the fourth does the clerical work, of which in a ship of this class there is a great deal, and is prepared to take the place of one of the above, if sick. The Artificers would be in charge of the stokehold.

In my opinion it would be a great mistake if the position or uniform of Engine-room Artificers were made at all grander than at present. Some inducement to remain in the service I think would be desirable, such as a yearly increase of pay, but not position. We have a very good class of men as Engine-room Artificers, but they are somewhat difficult to manage on first entering the Service, discipline being irksome, joining as late as they do, and their position as Chief Petty Officer prevents any punishment, except reporting their conduct to the Commander-in-Chief, and keeping them on board. I would suggest stoppage of pay, if a man leaves his work or returns from leave unfit to work, though sober at the moment. In fact, this would be the punishment in a factory on shore.

R. WELLS,
Captain.

NAVY (ROYAL MARINES).

RETURN to an Order of the Honourable The House of Commons,
dated 14 August 1877;—for,

COPY “of REPORT of a DEPARTMENTAL COMMITTEE appointed to Report
upon PROMOTION and RETIREMENT in the CORPS of the ROYAL
MARINES.”

Admiralty, }
14 August 1877. }

THOS. WOLLEY,
Chief Clerk.

R E P O R T.

TO THE LORDS COMMISSIONERS OF THE ADMIRALTY.

May it please your Lordships,

1. In obedience to the instructions conveyed in your Order of 19th February 1877, we have inquired into the subject of promotion and retirement in the Royal Marines; we have also examined the scheme for improving the position of the officers of the Royal Marines, prepared under your directions by the Deputy Adjutant General; and we submit for your consideration the result of our inquiries.

2. We have been guided generally by the principles laid down in Her Majesty's recent Warrant regulating promotion and retirement in the army, but we have not hesitated to suggest modifications of detail whenever, in our opinion, the constitution of the corps demanded them. We have been especially anxious to avoid changes in the conditions of existing Orders in Council for the mere sake of uniformity. Such changes can hardly fail to disturb individual interests, and ought not to be entertained except for some sufficient object.

3. We propose in the first instance to review shortly the changes which have taken place in the effective and non-effective lists of the Marine Establishment, and thus to assist your Lordships in forming a general judgment on the progress of Marine expenditure, on the effect of sudden reductions and augmentations of force, and on the measures, temporary or permanent, which have been adopted in order to obtain a physically efficient body of officers.

Effective Establishment.

4. The following table of established officers on full pay at different dates, exclusive of general officers, shows that since the conclusion of the
422. A great

great war considerable changes have been made in the organisation of the Marines:

	(a.) 1814.	(b.) 1818.	(b.) 1837.	(c.) 1838.	(d.) 1846.	(d.) 1856.	(d.) 1866.	(e.) 1869.	(f.) 1873.
Colonels Commandant -	4	4	4	4	4	4	5	4	4
Colonels second Commandant.	8	-	-	4	4	4	5	5	5
Lieutenant-Colonels -	19	8	18	14	14	18	20	15	15
Majors - - - -	16	9	8	-	-	-	-	-	-
Captains - - - -	187	95	105	92	99	125	152	112	141
Second Captains - -	16	-	-	-	-	-	-	42	-
First Lieutenants - -	386	102	106	124	136	184	211	220	200
Second Lieutenants - -	378	88	86	64	72	92	84		
TOTAL - - -	1,015	306	322	302	329	427	477	398	365

(a.) See Appendix to Report on Naval Promotion and Retirement, 1840. Parliamentary Paper, 235, p. 216, No. IV.

(b.) See Appendix to Report on Naval Promotion and Retirement, 1840. Parliamentary Paper, 235, p. 215, No. III.

(c.) See Appendix to Report on Naval Promotion and Retirement, 1840. Parliamentary Paper, 235, p. 216, No. IV.

(d.) Report of Committee on Army Retirement, 1867. Parliamentary Paper, 482, Appendix, p. 118.

(e.) Order in Council, 17th March 1869. (In addition to the number of subalterns shown in this table, there were 34 borne as supernumeraries until absorbed.)

(f.) Order in Council, 4th August 1873.

5. It will be observed that during the time under review the rank of colonel second commandant has been abolished and subsequently re-created; the rank of major has been abolished; that of second captain has been abolished, re-created, and again abolished; and that of second lieutenant has been abolished. If, however, the officers above the rank of captain be divided from the remainder, it will be seen that in spite of these frequent changes of organisation a somewhat similar proportion between inferior officers and superior officers below the rank of general has been maintained, at least since the peace.*

1814 - 967 Captains and lieutenants to 48 superior officers.	No. of active General Officers.
1818 - 285	Nil.
1838 - 280	Nil.
1846 - 307	Nil.
1856 - 401	10.
1866 - 447	10.
1869 - 374	13.
1877 - 341	12.

Supernumerary officers over and above the fixed establishment would probably cause a slight alteration of these figures, but would not disturb the general conclusion to which they point.

6. The charge on the Estimates for officers on full pay, exclusive of active general officers, has of course varied with their numbers, but it has not always varied in proportion to the strength of the force.

	Per Head.
It amounted to *145,000 l. for 1,015 officers in 1814 -	- 143 l.
„ *58,300 l. for 349 „ in 1831 -	- 166 l.
„ *49,500 l. for 302 „ in 1838 -	- 164 l.
„ and †65,600 l. for 365 „ in 1877 -	- 180 l.

In

* Appendix to Report of the Royal Commission on Naval and Military Retirement, 1840, Appendix IV., p. 216, excluding general officers, naval officers holding honorary marine commands, paymasters, barrack-masters, and surgeons, the secretary to the Commandant in London, and the Deputy Assistant Adjutant General.

† Estimates, 1877-78, p. 174, excluding the Deputy and Assistant Adjutant General and the additional pay of the aide-de-camps to the Queen.

In 1814 the force was 31,000 strong ; in 1831 and 1838 it was 9,000 strong, and in 1877 it is 14,000 strong.

(1.) If in 1877 the charge for officers on full pay bore the same proportion to the force as it bore in 1814, it would amount to 65,500 *l*.

(2.) If in 1877 it bore the same proportion to the force as it bore in 1831, it would amount to 90,000 *l*.

(3.) If in 1877 it bore the same proportion to the force as it bore in 1838, it would amount to 77,000 *l*.

It is 65,600 *l*.*

It will be seen that the proportional cost in 1814 and 1877 is nearly the same ; but in 1814 there was one officer to 29½ men. In 1877 there was one officer for 37½ men. Thus the same sum of money is distributed among a smaller number of officers, and the individual officer is benefited thereby without increase of cost to the State.

7. This result is no doubt greatly owing to reductions in the number of subalterns attached to a company. The first step in this direction was taken in 1825, and the Royal Commission on Naval and Military Retirement (1840) speak of it as follows (page 7) :—

“ With regard to the proportion of subalterns to a company, which is shown to have been four during the whole war, and so far back as 1779, we consider the reduction to two subalterns a company, which was effected in 1825, as calculated materially to improve the prospects of promotion now open to the junior officers, and we are induced to hope that it will prove not only amply sufficient for all the duties of the service, but also to afford a due encouragement of promotion.”

The measure is worthy of attention, as an endeavour to remove the main difficulty besetting the question of military promotion, viz., the inequality of ranks. The officers in the lower ranks are so numerous that it has been found impossible in ordinary times, and by ordinary methods, to pass them into the upper ranks, at an age consistent with efficiency. But the measure, though sound in itself, did not produce much effect, because the companies were weak. In 1783† the strength of a company was fixed at 52 privates with three subaltern officers, while in 1838 an infantry company‡ had only risen to 81 privates with two subaltern officers. Recent measures have been more effective. The number of subalterns to a company has indeed been increased to three, but the strength of a company of infantry has been raised to 191§ privates. Thus, although the number of the force has been raised from 4,500 in 1783, and 9,000 in 1838† to 14,000 at the present time, yet the number of company subalterns on full pay (210 in 1783† and 188 in 1838†) is now only 192^a. It is satisfactory to find that, in spite of a large increase of force, the corps can be efficiently administered with so small a number of subalterns, a number, it may be added, which is proportionately less than that employed in a battalion of the line.¶ There can be no doubt that the officers themselves will reap the benefit of an organisation which, producing fewer candidates for promotion to the higher ranks, diminishes in a corresponding degree the necessity for compulsory retirement.

226, officers, non-commissioned officers, and privates.

^a There are besides eight non-company officers.

8. We give these comparisons of cost and strength at different periods, because they indicate the principles upon which the force has been administered, and

* This comparison is confined to regimental officers, but it must not be forgotten that in 1814, 1831, and 1838, there were no active general officers, while in 1877 there are 12, costing about 8,500 *l*. a year. Thus the total charge of the effective establishment of officers (apart from staff appointments) in 1877 is about 74,000 *l*., or about 196 *l*. a head.

† Admiralty to the King, 28th June 1783. Report of Commissioners, 1840, p. 224 and p. 216.

‡ Memorandum of Board of Admiralty to the King. Appendix to Report of Commission of 1840, p. 223. Captain Burton's Evidence before the Commission on Military and Naval Retirement, 1840, p. 11, Question 341.

§ Order in Council, 4th August 1873.

¶ Report of Royal Commission on Promotion and Retirement in the Army, 1876, p. ix.

“ A battalion of the line may be generally stated to be thus constituted :—

“ 1 lieutenant-colonel.	|	“ 11 captains.
“ 2 majors.	|	“ 18 subalterns.”

and their financial results. We have only to add to these remarks on the effective establishment in past years, that in 1862 the corps was divided into two branches for purposes of promotion, viz., Artillery and Infantry, and that officers now only obtain promotion in that branch of the service to which they belong. By Order in Council of 4th August 1873, the establishment of the two branches are at present constituted thus :—

ARTILLERY, Including Gunnery Instructors and Adjutants, &c.	1 General.	INFANTRY, including Musketry Instructors and Adjutants, &c.	2 Generals.
	1 Lieutenant-General.		2 Lieutenant-Generals.
	1 Major-General.		5 Major Generals.
	1 Colonel Commandant.		3 Colonels Commandant.
	1 Colonel second Commandant.		4 Colonels second Com- mandant.
	3 Lieutenant-Colonels.		12 Lieutenant-Colonels.
	38 Captains.		103 Captains.
	49 Subalterns.		151 Subalterns.
	—		—
	95		282

Non-effective Establishment.

9. The Non-effective list has been revised as often as the active establishment. It is composed of—1, the half-pay list; and 2, the retired full-pay list.

Half pay.

10. The half-pay list dates from 1697. Formerly all officers retiring in ordinary course from active service were placed upon it, and it also bore the charge of officers removed from the ranks on reduction of force. The numbers upon it, therefore, though varying from time to time, were always considerable, and a comparison of it at different times would roughly gauge past fluctuations in the strength of the corps. The Committee of the House of Commons on Army Retirement in 1867 accompanied a suggestion increasing the retired full-pay list, with a proposal to confine the half-pay list to retirements from incapacity.

This policy has been practically followed since 1870. The half-pay list is now restricted to officers removed from the active list on accepting paymaster-ships or barrack-masterships, to officers placed on half pay for misconduct, and possibly to officers placed on half pay on reduction of the force; while officers incapacitated for active service by ill-health receive annuities under the 5th and 7th sections of the Order in Council of 1870, and are included in the Navy Estimates with other officers retired under that Order.

The 5th and 7th sections run as follows :—

“ 5. All officers to be retired, irrespective of age, at our discretion, if
“ physically unfit for the service.”

“ 7. Officers retired at an earlier age than that fixed for optional
“ retirement to receive such rates of retired pay as we may deem proper
“ in each case, not being less in amount than the sum fixed as the maximum
“ for the next lower grade.”

We were uncertain whether the 13th section of the Order, directing a deduction of 10 *l.* to be made from the fixed scale of pension for every year wanting to complete 22 years of service and upwards, might not apply to officers of less than 42 years of age, but we understand that it does not do so.

It appears to us that the Admiralty have power to place a captain or lieutenant of less than 42 years of age and 22 years of service, who is incapacitated by ill-health, either on the half-pay list or on the retired pay list on the following conditions :—

1. The

(1.) The Half-pay List:—

A lieutenant retired on less than three years' service can only receive temporary half pay for a period not exceeding three years, at the expiration of which time he ceases to be a charge upon the State, but it is not said whether he has then the option of returning to active service, if his health permits. From three to 10 years' service he can be placed on permanent half pay of 4 *s.* a day, or 73 *l.* a year, and after 10 years' service on 4 *s.* 6 *d.* a day, or 82 *l.* 2 *s.* 6 *d.* a year. A captain can be placed on permanent half pay of 7 *s.* a day, or 127 *l.* 15 *s.* a year.

(3.) The Retired Pay List:—

The meaning of the 7th section quoted above as applied to captains and lieutenants is not quite clear, but it appears to us that there is no limit under it to the amounts which the Admiralty may grant to officers of less than 42 years of age and 22 years of service; though it is of course implied that more cannot be granted than the scale assigned for officers of that age and upwards.

We understand that as matter of practice the Admiralty do not place officers incapacitated by ill-health on the half-pay list, but that they award them annuities under the 7th section of the Order in Council of 1870. These annuities are, however, usually equivalent in value to half pay, though we presume that your Lordships are not bound to observe that rule.

We learn that from the 1st of April 1871 to the 1st of April 1877, seven officers have been placed on the half pay list, two of whom retired to accept barrack-masterships, three retired from misconduct, two were allowed to retire because the force was in excess of its established number of officers.

During the same time, 17 officers were placed on the retired pay list as incapacitated by ill-health, of whom 15 were lieutenants, and were awarded allowances equivalent to half pay; the 17th, a captain, received on 17 years' service an allowance considerably in excess of half pay. One out of the 17 is dead; the remaining 16 officers cost the State 1,185 *l.* 12 *s.* 6 *d.* a year.

We must observe that the discretion exercised by the Admiralty, in awarding retired allowances to officers incapacitated after short service, is greater than that entrusted to the War Office. The Secretary of State may only award half pay to an incapacitated officer, upon a report from a medical board that the injury or disease which causes the incapacity has been contracted in and by the service. The new Warrant somewhat extends that power, enabling the Secretary of State to deal specially with special cases. The Admiralty, however, as we understand, may grant a permanent retired allowance upon a simple report from a medical board of incapacity, without reference to it having been contracted in and by the service.

We would call your Lordships' special attention to the cases of two of these 17 officers, who after nine and six years of service respectively, and at the ages of 27 and 25, were not able to go to sea because they were sea-sick, and were retired from the service on *allowances for life* of 82 *l.* 2 *s.* 6 *d.* and 76 *l.* respectively. We may also mention the case of an officer disabled by syphilis after service of one year and three months, who was placed on *permanent half pay* of 54 *l.* a year. We find from an actuarial report presented to the late Royal Commission on Retirements in the Army, that an allowance of 54 *l.* a year granted at 19 or 20 years of age, is in principle more expensive to the State than a pension of 200 *l.* at 40 years of age. In this case the Government will pay for an officer of one year's service, disabled not by work or climate, more than it will pay for an officer compulsorily retired after 20 or 22 years' service. We understand that, under the Order in Council of 1873, a permanent grant could not now be made unless the officer had completed three years' service, but we submit that this limitation is not sufficient, and we would submit for consideration whether the allowances granted by way of half pay or annuity to officers incapacitated after short service ought to exceed in cost to the State an amount equivalent to a pension of 200 *l.* at 40 years of age, or 225 *l.* at 42.

Full Pay retired list.

11. The Full Pay Retired List dates from 1791. In that year an "Invalid establishment" was formed. This establishment has undergone modification from time to time, and has been generally known as the full pay retired list. Up to 1854 it provided a fixed number of retirements for each rank of officer. The following Table gives the number of officers upon it at different times :—

	1792.	1810.	1818.	1823.	1835.	1838.	1849.	1851.	1854.	1866.	1870.	1877.
Generals - - - -	-	-	-	-	-	-	-	-	-	1	2	5
Colonels Commandant -	1	3	4	6	2	6	11	9	14	13	16	13
Colonels second Commandant.	-	-	5	-	-	-	2	1	2	8	6	4
Lieutenant-Colonels - -	1	1	5	5	2	6	9	6	14	24	24	25
Majors - - - -	1	5	8	5	3	4	1	1	1	—	—	—
Captains - - - -	13	35	34	28	35	61	57	60	58	50	45	77
First Lieutenants - -	6	11	16	14	12	11	10	10	10	3	2	} 19
Second Lieutenants - -	3	7	10	8	10	8	4	4	4	—	—	
	25	62	82	66	64	96	94	91	103	99	95	143

12. By Order in Council of 13th September 1854, the principle of a fixed number of full pay retirements for each rank was abolished, and in lieu thereof an annual sum of 35,000 £, in addition of course to the half-pay list, was granted to provide full-pay retirement for all ranks of officers. It was found afterwards by experience that this sum was on the average more than sufficient by about 4,000 £ a year.* In 1870 the limit of amount was abolished, and there is therefore now no restriction as to the total number of officers, or to the number of each rank of officer, who may be on the retired pay list.

Special and Temporary Measures of Retirement, 1814–1866.

13. Special retirements have also been granted from time to time, which we proceed to notice.

14. On the reduction of the force which followed the conclusion of the war, a great number of Marine officers were placed on half pay, and promotion in the corps was entirely stopped for the space of six years, vacancies being filled by officers brought back from the half-pay list.

Standard period of service in the Army, as determined by the Royal Commission on Promotion and Retirement (1876) :—

- 11 years 8 months' service before attaining the rank of captain;
- 18 years, 11 months before attaining that of major;
- 23 years 6 months before attaining that of lieutenant-colonel.

15. These measures speedily produced an entire stagnation in promotion† In 1826, the colonels commandant had on an average 49 years' service, the six lieutenant-colonels nearly 48, the six senior majors over 45, the six senior captains over 33, and the six senior lieutenants very nearly 25 years of service. The retired full pay list had then been lately reorganised, but other measures of relief were found necessary in order to relieve the ranks. Officers were accordingly for a time permitted to sell their commissions (1826–1833),‡ and in 1827 the Admiralty, following the example set by the Horse Guards, allowed, under certain conditions, subalterns whose commissions dated previous to the year 1812§ to retire with the rank and half-pay of captain, their places being taken by subalterns of less standing brought back from the half-pay list. About 57 officers appear to have retired by the sale of their commissions, but only 15 out of 64 qualified subalterns took advantage of the offer made in 1827.

16. These

° Report of Committee on Army Retirement.

† Appendix to Report of the Committee on Army Retirement, 1867, p. 117.

‡ Evidence before the Royal Commission on Army and Navy Retirement, Question 290.

§ Evidence before the Royal Commission on Army and Navy Retirement, Questions 437, 438.

16 These measures not proving, sufficient, the Admiralty obtained leave, by Order in Council of 30th April 1834,* specially to retire a certain number of officers on full pay in addition to those on the fixed retired full-pay list. The retired full-pay list was subsequently increased.† But in spite of these measures the block continued, and in 1836 the six senior lieutenant-colonels had on the average over 42 years' service, the six senior majors over 40 years' service, the six senior captains, 38 years' service, the six senior subalterns nearly 28 years' service.‡

17. The evil was felt and admitted. It became the subject of repeated discussions in the House of Commons, and to mitigate it two Orders in Council§ were passed in 1837. One of these, following the precedent of 1834, was temporary in its nature. It removed from the service, as a special measure, three lieutenant-colonels, one major, and 27 captains, who were no longer fitted from age and infirmity for the proper discharge of their duties. The other measure, dated 21st June, again revised and increased the fixed full pay retired list (see Table in paragraph 11).

The active establishment was at the same time reduced, as is shown in the table given in paragraph 4.

18. Even after these retirements the length of service in the junior ranks was considerable. There were at the commencement of 1839, 19 captains of more than 35 years' service, and 20 lieutenants of more than 17 years' service. ||

19. The Royal Commission on Promotion and Retirement in the Army and Navy, which owed its origin to the strong feeling expressed by the House of Commons on the subject of the Marine officers, approved generally the Orders in Council of 1837, and recommended further, (1) that officers should not be continued in command of divisions when no longer equal to the active duties of the service; (2) that the number of lieutenant-colonels allowed to retire on full pay should be increased from four to six, and (3), that the Admiralty should be authorised to allow two lieutenant-colonels annually to retire to permanent half pay at their request, but that these officers should not be eligible for further promotion by brevet or otherwise. These recommendations were adopted by Order in Council of 10th August 1840. The additional retirements allowed by the Orders in Council of 21st June 1837, and 10th August 1840, did not produce the desired effect, for in 1846 ¶ the six senior lieutenant-colonels averaged nearly 47, and the six senior captains rather more than 42 years of service, an average very much worse in both grades than that which existed in 1836, when the Admiralty decided that the efficiency of the corps was impaired in consequence of the age of officers in the various grades. In one grade, however, there was improvement, the average age of the six senior first lieutenants had been reduced from over 43 in 1836 to 37 in 1846, and their average period of service from over 27 to 18 years.**

20. During the next 10 years considerable changes occurred. By Order in Council of 10th November 1852, four lieutenant-colonels and four captains were specially allowed to retire, and a similar permission was given by Order in Council of 8th August 1853, to four lieutenant colonels.

21. But during this decennial period four lieutenant-colonels, 26 captains, and 68 subalterns were added to the force, and a temporary stimulus was given thereby to promotion. The effect of these combined measures reduced in 1856 the average service of the six senior lieutenant-colonels to 32½ years, of the six senior captains to 27½, and of the six senior lieutenants to over 10 years; the average ages of the lieutenant-colonels being 49, of the captains nearly 46, and of the lieutenants nearly 30††. See Appendix.

22. Between 1856 and 1866 no material alteration took place in the terms of retirement, but one colonel commandant, one colonel second commandant, two

* Appendix to Report of Royal Commission, 1840, p. 219.

† Appendix to Report of Royal Commission, 1840, p. 219.

‡ Appendix to Report of Commission on Army Retirement, 1867, p. 117.

§ Appendix to Report of Royal Commission, 1840, pp. 214-222.

|| Appendix to Report of Royal Commission, 1840, p. 215.

¶ Report of Committee on Army Retirement, 1867, pp. 116, 117.

** Appendix to Report of Royal Commission, 1840, pp. 214-222.

†† Report of Committee on Army Retirement, 1867, pp. 116, 117.

two lieutenant-colonels, 27 captains, and 19 subalterns were added; and in 1866 the average service of the colonels commandant was 33, of the colonels second commandant nearly 30, of the six senior lieutenant-colonels, 27, of the six senior captains, 25, and of the six senior lieutenants, nearly 11 years; the average ages of the colonels commandant being 50, of the colonels second commandant, 48, of the lieutenant-colonels, 44½, of the captains, 43, and of the lieutenants, 28.*

Compulsory Retirement.

23. The first measures involving a rule of compulsory retirement date from 1854 and 1858. The Order in Council of 13th September 1854 directed that a command of a general officer, or of a division of Marines, and situations on the staff of the corps, should not be held for more than five years, except by re-appointment; and an Order in Council of 13th November 1858, provided that an officer commanding a division of Royal Marines should retire therefrom on attaining the age of 60 years, unless the Admiralty were satisfied that the discipline and condition of the division made it advantageous for the service that such officer should retain his post for the regulated period.

24. In 1867 a Committee of the House of Commons, presided over by Mr. Childers, inquired into the system of retirement from the non-purchase corps. They recommended that, in lieu of the existing scale of full-pay retirement, every officer of 22 years' service and upwards should have a right to retire on a scale of annuity graduated according to service; that colonels of 60 years of age should be placed on a reserved list, should be considered ineligible for regimental duties, and should have a right to retire on 600 l. a year; that officers retiring should be allowed to commute; and that no officer should be retired on half pay except for wounds or ill-health.

25. No immediate action was taken on this Report, but in 1869 a considerable reduction of officers took place (*see* Table in paragraph 4).

26. In 1870 Mr. Childers reformed the whole system of promotion and retirement in the corps, applying to it the principles suggested in the Report of the Committee over which he had presided. These changes were embodied in the Order in Council of 22nd February 1870, which laid down the following propositions:—

- “That the system of compulsory retirement be extended to all the
- “higher grades, so as to cause a more even and constant flow of promotion:
- “That a scheme of retirement be established on a scale more liberal
- “than that now existing, and more duly proportioned to the length of the
- “service of officers.”

27. (1.) It recommended—

	Compulsory Retirement.	Voluntary Retirement.
	Years of Age.	Years of Age.
For Colonels at - - - - -	60	54
For Lieutenant-Colonels - - - -	54	48
For Paymasters and Barrack-masters holding Brevet or Honorary rank -	54	48
For Captains - - - - -	48	42

(2.) Retirement, irrespective of age, at Her Majesty's discretion, of officers physically unfit to serve:

(3.) It reserved power to suspend voluntary retirement; and

(4.) To regulate the allowances of officers retired at an earlier age than that fixed for optional retirement, provided that the amount should not be less than the maximum of the next lower grade:

(5.) It recommended that officers placed on the retired list should in no case be replaced on the active list, and that a step of honorary rank might be given to retired officers:

(6.) That

* Report of Committee on Army Retirement, 1867, pp. 116, 117.

(6.) That other officers should receive retired pay on a scale graduated according to service commencing at 20 years of age, and rising from 225 £., at 42 to 600 £. at 60 years of age, a deduction of 10 £. being made for each year wanting to complete the period of service specified in the above scale, except in the case of officers placed on half pay in order to effect reduction of the corps :

(7.) But that the retired pay for each grade should not exceed—

	£.
For a Colonel - - - - -	600
Lieutenant-colonel - : - - -	450
Paymaster and Barrack-master with Brevet or Honorary rank - - - - -	450
Captain - - - - -	300

(8.) That a colonel commandant either on attaining 60 years of age or at the expiration of his command, should be placed on a reserved list, with pay of 600 £. a year, and while on that list should be eligible for promotion to the fixed list of general officers in his turn, and if he should attain the age of 65 without being so promoted, that he should be removed to the retired list, retaining the pay of 600 £. a year. This condition was modified by Order in Council of 4th August 1873, which permitted colonels commandant, on completing their period of command, to retire, if they pleased, on 600 £. a year with the honorary rank of major general, instead of taking their places on the list of reserved colonels.

(9.) That an officer retired at his own request should be allowed to commute his retired pay, but that no pension, except a pension for wounds, should be commuted.

28. An Order in Council of 5th of February 1872, so far modified these conditions as to allow officers who entered the force before 1st April 1870, and who obtained their first commissions before attaining 18 years of age, to reckon their service for retirement from the age of 18 ; those who entered at or after 18 years of age to reckon their service from the date of their first commission ; and it authorised temporarily a scale of pensions for full pay service of 12 and under 22 years, in order to facilitate retirements, until the normal number of the force should be attained. Some further changes were made by the Order in Council of 4th August 1873, including a reduction of the period of staff employment from five to three years.

29. These are the present regulations. They have now been in force for more than seven years, and although during that period a reduction of the corps has been effected, they have produced satisfactory results within the limits to which they apply, as we shall show hereafter (*see* the ages given in paragraph 38).

30. We give a comparison of the numbers on and the cost of the retired lists as they stood on the 1st January in the following years :—

1.—Numbers.

	Half Pay.	Retired Full Pay.	TOTAL.
1792 - - - - -	460	25	485
1814 - - - - -	346	61	407
1818 - - - - -	822	82	904
1823 - - - - -	580	66	646
1824 - - - - -	642	58	700
1831 - - - - -	472	48	520
1837 - - - - -	427	64	491
1838 - - - - -	411	96	507
1846 - - - - -	336	85	421
1856 - - - - -	238	85	323
1866 - - - - -	165	99	264
1869 - - - - -	139	85	224
1870 - - - - -	195	95	290
1877 - - - - -	138	142	280*

* Of this number 86 officers have commuted, viz., 46 on half pay and 40 on full pay.

2.—Cost.

YEAR.	Active General Officers charged on Non-effective Votes.	Half Pay.	Retired Full Pay.	Annuity paid by the Admiralty representing Commuted Pensions.	TOTAL.
	£.	£.		£.	£.
1814 - - - -	- -	- - 30,330 - -	- -	—	—
1818 - - - -	- -	- - 82,707 - -	- -	—	—
1826 - - - -	- -	- - 58,749 - -	- -	—	—
1831 - - - -	- -	- - 50,297 - -	- -	—	—
1838 - - - -	- -	- - 55,078 - -	- -	—	—
1846 - - - -	- -	- - 46,608 - -	- -	—	—
1856 - - - -	7,026	- - 50,430 - -	- -	- -	57,456
1860 - - - -	8,046*	15,652	32,806	- -	56,499
1869 - - - -	5,676†	14,767	30,620	- -	51,063
1870 - - - -	5,676†	20,869	33,605	- -	60,150
1877 - - - -	8,711	10,241	36,165	13,155	68,272

* There was an allowance in this year of 691 l. for an Inspector General of Marines.

† Five generals received pay on active list as colonels of Divisions, costing 4,500 l. a year, which should be added for purposes of comparison.

Summary.

31. We may summarise thus the review of Marine administration which is given in preceding paragraphs:

See Appendix.

The number of officers on the active establishment has varied in a very striking manner. During war, or even in troubled times, an increase of force might be expected, followed by reduction to the normal establishment when quiet was restored, but it is difficult to explain the fluctuations which formerly took place, even in ordinary times, from year to year. The total force of the Marines, including officers and men, which before the great war had amounted to between 4,000 and 5,000 men, rose to 31,000 towards the close of the war, sank in 1816 to 6,000, and rose again to 9,000 in 1824, at which strength it remained for 17 years. It then rose gradually to 18,000 during the Crimean war, and was not materially diminished during the next 10 or 12 years. It was put on a permanent footing of 14,000 men in 1873, and the officers on the active list have now been reduced to the normal number of the peace establishment. We have pointed out that the cost of the officers bears a smaller proportion to the number of the force than it did in former years. In other words the force is officered at less cost to the public than in former years, and this economy has been mainly effected by substituting large companies for small ones, and reducing the number of subalterns. We have mentioned the beneficial result to the officers themselves, especially under the present system of compulsory retirement, because reducing the number of subalterns reduces also the number who have to be compulsorily retired. Turning to the retired and half-pay lists, we have shown that at the close of the French war great numbers of officers were placed on half pay. Promotion was stopped, and vacancies were filled from the half-pay list. The natural effect was produced, viz., a corps inefficient through age. Various remedies were tried, and a certain number of officers were even allowed to sell their commissions, although they belonged to a non-purchase corps. Special retirements were offered from time to time, and the small full pay retired list existing at the peace was increased and re-organised not less than four times before 1870. We have shown that these measures did not effect their object, and that the corps in 1846, as in 1826, was inefficient through the age of its officers. The large increase of numbers,

numbers, that followed, removed for a time the block, and officers obtained promotion at early ages, but it was foreseen that the block must return, and evidence to that effect was given before the Committee on Retirement in the non-purchase corps, of which Mr. Childers was chairman. At that time retirements were entirely voluntary, except for misconduct or ill-health. Officers in command of a division, indeed, were not allowed to retain their posts after 60 years of age except under special circumstances, and of course in the event of a reduction of force officers were liable to be placed on half pay. It may fairly be said that, during the half century ending 1870, voluntary retirement and temporary measures have been tried and had failed.

In 1870, Mr. Childers, when First Lord of the Admiralty, obtained the assent of Parliament to an entire change of system. The main principle of the new scheme was the compulsory retirement from the rank of captain upwards of all officers who had not obtained promotion at a given age, and on a given amount of service. But in order to lessen the hardship of compulsory retirement, liberal inducements were held out for voluntary retirement, and officers were allowed to commute, for capital sums, retired full pay, permanent half pay, and pensions for wounds. The number of the effective force was at the same time largely reduced.

32. In concluding this part of the subject, we may point out that the retired lists are now almost relieved of the dead weight of officers reduced after the great war.* They therefore represent the non-effective charge attaching to the staff of officers required for a force originally of 9,000 men, increased to 18,000, and reduced again to 14,000. It is evident that, if the force had been constant throughout at 14,000 men, a greater number belonging to the earlier period would be now on retirement, but it is evident also that there would have been much fewer retirements later, because there would have been no reduction of force.

In order to compare the non-effective lists at present with the non-effective lists as they will stand when the Regulations of 1870 have reached their normal development, we have obtained from Mr. Finlaison, the actuary of the National Debt Office, a calculation of the number and charge of the officers, who will probably be on the retired lists when the present system is in full working order, undisturbed by reduction of force or other causes. He calculates that the normal full pay retired list would consist of about 158 persons, costing the State 52,300 *l.* An addition must be made for officers retired under 42 years of age on account of ill-health, who are awarded annuities under the 7th section of the Order in Council of February 1870. If existing regulations remain unaltered and the average of the last six years, 2·83, be maintained, the number and cost of these retirements will be considerable, possibly 70 persons, entailing a charge of (say) 6,000 *l.* a year.

The half-pay list will be by that time much reduced, as no officers except those holding paymasterships† or barrack-masterships, or reduced for misconduct, will be upon it. The number may perhaps be taken at 20, costing say 1,000 *l.* a year. There will be also 12 generals on the active establishment but charged on the non-effective votes, and costing 8,514 *l.* The total number on the non-effective list would thus be about 250, costing from 67,000 *l.* to 68,000 *l.* a year. The estimate of the current year provides for 296 officers, costing 68,272 *l.*

Present State of the Corps.

33. Turning now to the present condition of the corps, we shall compare the existing Marine Regulations with those recently laid down for the Army; we shall give the actual ages of officers now on the Marine Establishment; and we shall show that the result produced has been obtained by means of a larger number of retirements than would have been required, if first appointments had been duly regulated in former years.

34. The Royal Warrant for the Appointment, Promotion, and Retirement of Combatant Officers in the Army determines, for the Army of the future, (1),
that

* There are six officers still on half pay who were placed on half pay previous to the year 1824.

† Retiring captains will probably be made paymasters, and the half-pay list in that case would not be increased.

that a captain shall become a major by 40 years of age; (2), that a major shall become a lieutenant-colonel by 47 years of age; (3), that a lieutenant-colonel shall cease to command a regiment at 52 years of age; (4), that a colonel shall become a general officer by 55 years of age; and (6), that a general officer shall retire at 70.

35. The Order in Council of 1870 secures for the Marines the promotion of a captain to a lieutenant-colonelcy by 48, and the promotion of a lieutenant-colonel to a colonelcy by 54 years of age. It enforces the retirement from the service of colonels at 60, of reserved colonels commandant at 65, and of general officers at 70 years of age. In saying that the Order in Council and the Warrant secure promotion by the specified ages, we mean that those, who are not promoted before attaining those ages, must retire from the service, or at least from the regiment. It is clear, therefore, that the specified ages represent a maximum, and that the average age of officers, when entering the grade to which a limit of age attaches, will be below that specified.

36. A comparison of the Order in Council and of the Warrant shows that the condition of promotion to the higher ranks will be similar in the two branches of the service, making some allowance for differences of constitution.

37. On two points, however, there will be a considerable difference between them:—

1. In the Army there will be no captain serving with his regiment of more than 40 years of age; in the Marines there will be captains up to 48 years of age.

2. In the Army no colonel will become a general officer after 55 years of age; in the Marines promotion to that rank will be open up to 65 years of age.

38. The average ages of the Marine offices at the present moment are as follows:—

INFANTRY:—

	Years.	Months.
Colonels Commandant -	55	9
Colonels Second Commandant -	54	9
Six senior Lieutenant-colonels -	52	8
Six senior Captains -	46	6
Six senior Lieutenants -	34	5

ARTILLERY:—

	Years.	Months.
Colonel Commandant -	49	6
Colonel Second Commandant -	51	5
Lieutenant-colonels -	47	4
Six senior Captains -	43	10
Six senior Lieutenants -	28	1

39. These averages would not have been obtained in the higher ranks but for the number of officers retired in the seven years elapsed since 1870. During that time 21 officers have been compulsorily removed under the new regulations, and 51 officers above the rank of subaltern have voluntarily withdrawn. Thus altogether 72 officers above the rank of subaltern have retired. This number, after making allowance for a reduction of force in 1873, is very large, but, owing to the fact that no care was formerly taken in making first appointments, so many officers of about the same age filled the ranks as to make the retirement of a majority of them inevitable, as soon as a system of compulsory retirement came into force.

40. Under that system the mischief caused by an excess of first entries is obvious, for if in any one year an unnecessary number of officers be appointed to the corps at the age of (say) 18, there will be an unnecessary number compulsorily removed from the corps 30 years later, when the first limit of age, viz., 48, is reached.

The irregularity in making first appointments, which formerly prevailed, is shown in the following statement:—

Number of First Entries in 1840 -	5	Number of First Entries in 1846 -	18
" " 1841 -	35	" " 1847 -	22
" " 1842 -	28	" " 1848 -	54
" " 1843 -	9	" " 1849 -	28
" " 1844 -	11	" " 1850 -	12
" " 1845 -	13		

and we find that the same criticism will apply to many years following those quoted, including indeed the year 1876; that in consequence an excessive number

number of officers will, from time to time, during many years, arrive at the age of 48 about the same time, and that an unnecessary number will be compulsorily removed from the service. We are anxious to direct your Lordships' special attention to this point, because we are convinced that appointments in excess of the real requirements of the service cannot fail to inflict unnecessary injury on individual interests, and to entail unnecessary expenditure on the State. Mr. Finlaison has, at our request, made a calculation of the number of officers who, under the present organisation, should be appointed yearly to the corps in order to prevent the above-mentioned evil. He finds that if 13 officers enter the force every year at 18 years of age, nine (and 10 every third year) will arrive in 30 years at the age of 48, and at the top of the captains' list. Of these, three (two every third year) will be promoted, and seven (six every third year) will have to retire. This calculation allows for death vacancies, but does not allow for other casualties, which will occur to some extent. If some allowance be made for casualties, 14 or 15 fresh appointments yearly would probably suffice for the whole force. If, then, 40 or 50 men, as in some former years, were to be appointed in the same year, and of about the same age, there can be no doubt of the fate to which the majority of them would, from the day of their entry into the service, be predestined.

41. It appears to us, then, that the secret of just and economical administration of the present system lies in the careful regulation of first entries, and it should be a rule most strictly observed only to enter so many yearly as will keep the ranks full, allowance being made, of course, for promotion, death, and casualties. If at any time the force be increased or diminished, the effect of such increase or diminution upon the establishment should be carefully considered, with the assistance of an actuary. In the case of an increase, it should be spread over as long a time as possible, and care should especially be taken to enter, if possible, men of somewhat different ages.

Recommendations.

42. We proceed now to consider whether further measures are necessary, in order to procure a satisfactory flow of promotion in the corps, and we have to record our opinion that, under existing regulations, the passage from the rank of subaltern to that of captain will not be attained at a sufficiently early age. We find from examination of the lists that, on the 31st December 1877, the age of the senior subaltern in the Marine Infantry will be 35 years and six months, and each succeeding 31st of December will show an increased age for the officer in that position, until the 31st December 1889, when the senior subaltern will be 40 years and five months old, after which the age will decline again. The death-rate in a corps constituted like the Royal Marines may be taken at about 1½ per cent. per annum, and allowance must be made for further vacancies arising from that cause. Voluntary retirements, in ordinary circumstances, are not numerous. Indeed, the greater part of them will probably occur among those who, if they remained, would be compulsorily retired within a short time on account of age. Some allowance must, however, be made for them and other casualties.

Promotion of sub-
alterns needs
acceleration.

43. We arrive at the opinion which we have just recorded after a careful examination of the list of officers now in the service, and we are, of course, able to say, as matter of fact, that if retirement, irrespective of death and casualties at certain ages is, compulsory, such and such officers will retire in such and such a year.

44. But we have also thought it right to ascertain the effect of the present regulations, when they are working at a normal rate, the entries for each year being so ordered that retirement will act uniformly from year to year; and we learn from Mr. Finlaison that, supposing lieutenants to be appointed at the age of 18, and nine appointments of lieutenants to be made in each year to the Infantry branch, the duration of service in each grade of the Infantry would tend towards the following periods:—

Lieutenant	-	-	-	-	-	-	-	-	-	17 years
Captain	-	-	-	-	-	-	-	-	-	13 "
Lieutenant-colonel	-	-	-	-	-	-	-	-	-	6 "
Colonel second Commandant and higher grades	-	-	-	-	-	-	-	-	-	16 "

In other words, existing regulations will tend to produce a senior subaltern of the age of 35. It should be added that Mr. Finlaison makes allowance for death vacancies, but not for voluntary retirements.

45. The result of these calculations convinces us that means must be found for shortening service in the rank of subaltern. A temporary remedy for stagnation of promotion in the shape of special pensions, similar to those offered to the Royal Artillery by the Royal Warrant of 31st May 1871, could, of course, be devised, and the overcrowded ranks of subalterns could be relieved for a time. It will be seen that there are precedents for this remedy in the recent history of the Marines themselves. It appears, however, to us that certainty as to prospects is indispensable to contentment in the service, and that a system which deliberately contemplates stagnation of promotion, at recurring intervals, to be removed by temporary measures, differing in their character, uncertain in their date of application, and dependent on the will of the Minister for their adoption, is open to very grave objection.

46. A system that works of itself, and that works evenly, is essential to fair promotion. Under such a system an officer can estimate beforehand with tolerable accuracy his chances, and make his arrangements accordingly. The rule of retirement is the same for all, and, if occasionally hard, is at least impartial in its operation. We therefore think that any further measure intended to secure proper promotion in the Marines should conform to the above-named requirements, and that a sufficient flow of promotion can only be obtained by an extension of the principle of compulsory retirement first adopted for the Marines in 1870.

47. We find that that principle has worked satisfactorily up to the present, but that, only commencing with officers when they arrive at the age of 48, it cannot secure fairly quick passage through the subaltern rank.

48. The recent Royal Commission on Promotion and Retirement in the Army adopted the principle of compulsory retirement for the Army generally, and announced its deliberate opinion, that a sufficient flow of promotion can only be secured by calling on captains to retire, if they have not obtained field officers' rank, at the expiration of 20 years of service. Their recommendation is based on the assumption that service will count from 20 years of age. It therefore means that, in the army of the future, unpromoted captains will be compulsorily removed from their regiments at 40 years of age. The Secretary of State for War has adopted this recommendation, it has been approved by Her Majesty, and accepted by Parliament.

49. Under the present constitution of the Marines, there being no regimental rank of major, it would be impossible to retire unpromoted captains at 40 years of age, and we have therefore considered, first, whether our object could be attained by requiring subalterns to retire who had not obtained the rank of captain at 32 years of age. Then, if the age of entry were 18 years, the duration of service would not exceed,—

In the rank of Lieutenant	-	-	-	-	-	14 years.
„ Captain	-	-	-	-	-	16 „
„ Lieutenant-colonel	-	-	-	-	-	6 „
In the higher grades	-	-	-	-	-	16 „

50. The Army Commission recommended that a pension of 200 l. a year should be given to captains compulsorily retired at 40 years of age. A pension of 150 l. at 32 years of age is equivalent in cost to the State to a pension of 200 l. at 40 years of age, and we find that the cost of the present system, with such a new rate of pension added, would be to the cost of the present system as it stands as 115½ to 100.

51. By a pension equivalent in cost to the State, we mean a rate of pension, which granted to a given number of men of 32 years of age, would entail exactly the same expenditure upon the State that a rate of 200 l. a year would entail, if granted to the survivors of that body of men attaining the age of 40 years.

52. We, however, are unwilling, if it can be possibly avoided, to recommend the dismissal of men at so early an age, and we have therefore considered whether

whether there are not other and preferable alternatives, and this brings us to a grievance on the part of Marine officers, which we cannot but think deserves the most careful attention, and the removal of which might solve the question at issue.

53. In cavalry and infantry of the line the rank of regimental major is introduced between the captains and the lieutenant-colonels. Revival of the rank of major.

Until a recent date no such rank existed in the non-purchase corps, viz., the Artillery, the Engineers, and the Marines. In 1872, however, Lord Cardwell stated, that having in view the number of men composing a battery of Artillery, the value of the material belonging to it, and the independent action of a battery in actual warfare, and the great importance generally of the duty, he proposed to confer on the officers commanding a battery the regimental rank of major. He proposed at the same time to create a similar rank in the Engineers, adding that, although the grounds for creating majors in the Artillery did not apply to the Engineers, yet he deemed it essential to maintain a fair equality between the two corps, which draw their officers from the same class of candidates at the Royal Military Academy.

54. In the Line, in the Engineers, and in the Artillery, when the new system comes into operation, all officers of more than 40 years of age will be majors. But officers in the Marines of greater age and longer service will still be captains, and will take rank below and receive less pay than their juniors in the other branches. This grievance was of course not so striking while purchase was in existence, and while the non-purchase corps generally were organised on a totally different principle from the purchase corps; but now that the missing rank has been bestowed on two out of three of the old non-purchase corps, we cannot but think that the Marines have a fair cause of complaint, since they alone are left in a disadvantageous position.

55. It should be remembered that the rank of major formerly existed in all three corps, that it was only abolished in the Marines as late as 1837, and that it was then avowedly abolished* because it had been abolished in the Artillery and Engineers. According to this argument the revival of the rank in those two corps should have been followed by the revival of it in the Marines.

56. It may of course be questioned whether there are sufficient military grounds for such revival, in short, whether the organisation of the force requires the superior rank.

From this point of view it may be argued that it would be of advantage to the service if the officer commanding the detachment of Marines in a flagship were the senior Marine officer of the squadron. He would then be at hand to receive the instructions of the admiral, and to confer with him, when required, on matters affecting the Marine detachments of the squadron; and should the Marines of the fleet be landed for drill or other purposes, the senior officer would belong, as a matter of course, to that ship from which the orders emanate.

This object would be attained if an officer of the substantive rank of major were embarked in each flagship of a squadron, captains remaining as at present to do duty in other ships.

Marines when employed on shore are divided, for purposes of drill and manœuvre, into battalions, each battalion being commanded by a lieutenant-colonel, with an officer representing a major for each half-battalion, each half-battalion being again divided into companies. Whenever the divisions of Marines have to furnish a force for field service, or to turn out for drill, the duties of majors are performed by the senior captains, who may or may not be mounted officers, as they happen to be brevet officers or otherwise. It may be added that in the modern "Formation for Attack" manœuvres are usually performed by half-battalions, the constituted commands of majors, and it may be pleaded that majors should exercise majors' commands.

57. We have some hesitation in thus dealing with a question of organisation, but

* Extract from the Order in Council of 21st June 1837 :—" We are of opinion that with the view of placing the Marine Corps on a similar footing with the Artillery and Engineers, the rank of major should be abolished."

but we feel it our duty to bring the proposal to your Lordships' attention, not only on its own merits, but because it would remove a substantial grievance. It would of course also facilitate the extension of the retirement system in the direction which we consider essential for the proper organisation of the service, for the constitution of the Marines could then be assimilated to that of the other arms, by providing that captains not promoted by a certain age must retire. We think that a major might be assigned to each double company consisting, all told, of about 452 men in the Infantry and 354 in the Artillery.

58. We learn from Mr. Finlaison that, supposing officers to enter at 18 years of age, and to retire if they have not become majors after 22 years' service at 40 years of age on 200*l.* a year, the result will be as follows: 15 and 16* appointments of lieutenants must be made in alternate years to the corps in order to keep the ranks full, eight captains, on arrival at the age of 40, will be retired compulsorily, while the duration of service in each grade will approximate to 14 years as lieutenant, to eight as captain, to eight as major, to six as lieutenant-colonel, and to 16 in the higher grades. The cost of the system will be 115 as compared with 100 at present.

59. It will, however, be some time before the normal rate is reached. In order therefore to test the working of such a regulation in the next few years, we have calculated the effect which it would have on officers now in the service, and we find that, applied to the present establishment, it would for a time produce a rate of promotion more rapid than that which we think necessary, involving, as it would, a large number of compulsory retirements.

See Appendix 10.

We find (1) that, under existing regulations, the junior subaltern now on the infantry establishment would, irrespective of deaths and casualties, only be promoted in 1893 at the age of nearly 36; we find (2) that if unpromoted captains were retired compulsorily at 43 years of age, the junior subaltern now on the establishment would be promoted in 1890 at an age somewhat in excess of 32 years; and we find (3) that if unpromoted captains were retired compulsorily at 40 years of age, the junior subaltern on the existing establishment would be promoted in 1887 at an age but little in excess of 29 years. It must be borne in mind that these are maximum ages.

60. Between 1877 and 1887, in the first case 51 infantry captains, in the second 59 captains, and in the third 106 captains, would be compulsorily retired. Casualties will modify in some degree these results, but the figures justify us in our conclusion that compulsory retirement of unpromoted captains at 40 years of age would produce a flow of promotion more rapid than is absolutely needed for the service, considering that it is only purchased by the dismissal of a large number of officers against their will.

61. We consider that, when the choice lies between general stagnation of promotion inevitably leading to inefficiency of the service, and the compulsory retirement of a certain number of officers, the interest of individuals must give way to the interests of the public service, but that the greatest care should be taken not to have recourse to so harsh a measure, except so far as the undoubted interest of the public service demands.

62. We come to the conclusion, acting on this principle, that compulsory retirement at 40 is too early, that compulsory retirement at 43 would not produce sufficiently rapid promotion, and that an intermediate period should be chosen between 40 and 43 years of age, and that captains unpromoted at 42 years of age should be compulsorily retired. We find that in that event it would be necessary to appoint to the corps 14* (15 every third year) lieutenants annually at the age of 18, and that such a system would tend to produce a service of 15 years as lieutenant resulting in promotion to the rank of captain at 33 years of age; six captains on arriving at the age of 42 would retire compulsorily every year, but in the third year five only would retire.

63. The cost of such a system of retirement compared with existing regulations would be as 109 to 100. We find that retirement at 42 would, apart from death

* This calculation only includes death vacancies; one or two additional first appointments might have to be made in order to provide against other casualties. Experience alone can decide the precise number.

death and casual vacancies, ensure the promotion of the existing junior subaltern at in about the age of 31 in the Infantry, and of 32 in the Artillery.

64. If your Lordships should approve our proposal, an officer entering the Marines at the age of 18 will have 24 years of service before he will become liable to compulsory retirement. At 42 years of age he will have become a major, or he must retire. We may observe that under the Order in Council of February 1870 pensions for voluntary retirement commence at the age of 42.

65. In the army the unpromoted captain of 40 years of age cannot continue with his regiment, and will receive on retirement 200 *l.* a year. We find from the reports made by the actuaries of the War Office to the late Royal Commission, that at 42 years of age an annuity of 225 *l.* is about equivalent in cost to the public to an annuity of 200 *l.* at 40. We therefore propose that the annuity granted to captains in the Marines compulsorily retired at the age of 42 should be 225 *l.*, the commuted value of which on a sound life at that age would be about 2,911 *l.*

66. The Army Commission advised that majors should retire from their regiments at 47 years of age, and lieutenant-colonels at 52. The Order in Council of February 1870 compels retirement of unpromoted captains in the Marines (majors according to our proposal) at 48 years of age, and of lieutenant colonels at 54.

Retirement of majors and lieutenant colonels.

67. We find that the existing limits of age are satisfactory, and we recommend that they be maintained, holding, as we have already observed, that it is not desirable to interfere with existing regulations for the sole purpose of introducing uniformity into different branches of the service.

68. At present colonels second commandant are retired at the age of 60, and colonels commandant, either on attaining 60 years of age, or at the expiration of their commands, are placed on a reserved list, with succession to the fixed list of general officers, until they attain the age of 65, when, if unpromoted, they must retire. We know of no reason for exempting colonels commandant from the ordinary rule of compulsory retirement which will apply to every other rank in the corps, and as this reserved list may occasionally interfere with the regular flow of promotion, and as recommendations which we make hereafter will tend to secure earlier promotion to the rank of general, we come to the conclusion that there is no good reason for maintaining it. We recommend, therefore, its abolition. In that case colonels commandant, if they have not been promoted to the rank of general, will retire at the age of 60, or at the expiration of their commands, on 600 *l.* a year. Colonels second commandant will retire as at present.

Retirement of colonels second commandant, and of colonels commandant.

69. The main principle of the Order in Council of February 1870 is the same as that of the recent Army Warrant. It secures a certain flow of promotion by enforcing the retirement of officers who have not attained a given rank by a given age; but it supplements that measure by a system of payments to officers retiring of their own accord, which differs from that adopted in the Warrant. It offers to such officers a scale of pension beginning at 22 years of service and 42 years of age, and ending at 40 years of service and 60 years of age. The Army Warrant contains no such scale of pensions; it permits the Secretary of State to pay lump sums of money to captains allowed to retire on 12 and less than 20 years of service, and also to majors allowed to retire on 20 and less than 23 years of service. It grants a pension of 250 *l.* a year to majors and lieutenant-colonels allowed to retire on 23 years and less than 27 years of service. It grants a pension of 300 *l.* a year to lieutenant-colonels of 27 years and less than 30 years of service, and a pension of 365 *l.* to lieutenant-colonels of 30 years of service, who have not completed their term of command. As there will be henceforth one principle of enforced retirement in both the Army and the Marines, so there should, in our opinion, be one principle of voluntary retirement. We, therefore, suggest that the scale of pensions granted by the Order in Council to officers allowed to retire be abolished; and we have the less hesitation in making this recommendation because we do not find that these pensions are now often taken. In lieu of them we propose (1) that your Lordships should have the power of giving a lump sum to an officer of less than 22 years' service, who may wish to retire, if you are satisfied that such retire-

Voluntary retirement on 18 years' service and upwards.

ment will save a compulsory retirement at a later date. We suggest this proviso because the measure will not, when the scheme is in normal operation, be required to aid promotion in the corps, but solely to mitigate the hardship of compulsory retirement. It is further important that the number of first entries should not, if possible, be increased in order to supply the vacancies thus created, because, as we have pointed out, every first appointment in excess of the normal number involves an additional compulsory retirement at a future day, and, unless great care be taken, an expensive measure, solely intended to diminish compulsory retirement, will indeed diminish it on one hand, but will increase it on the other, and thus expense will be incurred for no object. We think, therefore, that compensation should only be made to officers retiring voluntarily on not less than 18 years' service. The fixed amounts might be 2,000*l.* for 18* and less than 20 years' service, and 2,400*l.* for 20 years and less than 22 years' service. It might be also desirable that the assent of the Treasury should be obtained for such payments.

We are aware that the Army Warrant permits the Secretary of State to pay lump sums to officers retiring on 12 and 15 years' service, and it may be desirable, as experience is gained, to assimilate the regulations of the Marines more nearly to that of the Army, but we hold that, in the first instance, the experiment should be limited in the manner that we suggest.

70. We recommend further, following the analogy of the Army Warrant,—

(1.) That a pension of 225*l.* a year be granted to majors and lieutenant-colonels of not less than 22 but of less than 25 years' service, who are allowed to retire;

(2.) That a pension of 260*l.*† a year be granted to officers of these grades of 25 but of less than 28 years' service, who are allowed to retire;

(3.) That a pension of 300*l.* be granted to lieutenant-colonels of 28 but of less than 30 years' service, who are allowed to retire, and a pension of 365*l.* to lieutenant colonels of 30 years, and of less than 34 years' service.

71. In the last case, we think that officers who entered the Marines before 1st April 1870 should retain the right of counting their service from the date of their commissions.

Voluntary retirement on less than 18 years' service.

72. In the Army, officers retiring on less than 20 years' service can only receive the gratuities permitted by the Royal Warrant, or, if incapacitated, be placed on temporary half pay on a report of a medical board that the incapacity was contracted in and by the service.

We have pointed out that your Lordships have power to place such officers either on permanent half pay, or on annuity, under the 7th section of the Order in Council of 1870.

We venture to think that the powers possessed by the Admiralty are too large, and we think that the same limit should be placed on their discretion as is placed on the discretion of the Secretary of State for War. If special power is reserved to deal with special cases, we think the award should be subject to the approval of the Treasury.

We think, further, that the regulations authorising grants of half pay or annuity on incapacity after short service need revision, in order that such grants may not be more costly to the State in the cases of young than in those of old officers.

73. The Estimates are framed so as to show separately, and under separate total sums, the charge of officers, (1.) who retired previously to the Order in Council of 1870 taking effect; (2.) who have retired under that Order and the Orders amending it; and (3.) the half-pay list, including annuities granted on less

* These sums correspond to those adopted in the Army.

† In the Army the pension granted on voluntary retirement after completion of about half the term for which a majority can be held is 250*l.*, being half the difference between 200*l.*, the pension granted on compulsory retirement at 40 years of age, and 300*l.*, the pension granted on compulsory retirement at 47 years of age; the pension of 260 *l.* is arrived at on the same principle.

less than 22 years' service. We think that a few words might be added to make it clearer that such is the division, that the half-pay list should be stated separately from the list of annuities under Clause 7 of the Order in Council, and that the amount of the annuity payable to the National Debt Commissioners in lieu of Marine pensions and half pay commuted should be appended in a note.

74. We have had before us a claim of the Marine Artillery for the restoration to their branch of a lieutenant-colonelcy abolished in 1859.

Additional lieutenant-colonelcy for the Marine Artillery.

At the time of the separation of the corps for purposes of promotion into the two branches of Artillery and Infantry there were few Artillery officers of long standing, and very young officers were promoted to the higher ranks; the consequence is that they have a long time to serve, and that the compulsory retirement falls upon officers of the lower ranks. The Artillery is, in fact, suffering from the effects of its good fortune. This, however, is an inconvenience which will remedy itself. We, of course, confine ourselves to the consideration whether the number of officers in the different grades bear a proper proportion to each other.

At the present time the establishments of the two branches are as follows:—

	Generals.	Colonels Commandant.	Colonels 2nd Commandant.	Lieutenant- colonels.	Captains.	Lieutenants.
Artillery - - -	3	1	1	3	38	49
Infantry - - -	9	3	4	12	103	151

or one superior officer in the Artillery to 10·875 captains and lieutenants; while the Infantry have one superior officer to 9·07 captains and lieutenants. If a fourth lieutenant-colonel were added to the Artillery, the proportion would still be in favour of the Infantry. We may point out that each of the three Infantry divisions has four lieutenant-colonels, while the Artillery division has only three; but it must be added that the Artillery division is not so strong numerically as the Infantry, being composed of the same number of companies, but with fewer men to the company. It should be, on the other hand, added, that a comparison of the Royal Artillery with the Marine Artillery shows that the former has more lieutenant-colonels in proportion to the force than the latter.

75. In the case of a small corps, it is most important that the proportion of ranks should be carefully maintained, and there certainly appears to be no reason why the Artillery of the Marines should be on a less favourable footing than the Infantry. We accordingly recommend that a fourth lieutenant-colonel be added to the establishment of the Artillery.

76. The Royal Commission on Promotion and Retirement in the Army came to the conclusion that, in time of peace, seniority tempered by rejection must, as a rule, govern promotion, but they suggested that a certain number of unattached commissions should be placed annually at the disposal of the Commander in Chief, for the purpose of rewarding individual officers of special merit and promise. This suggestion has been adopted by the Secretary of State, and has been approved by Her Majesty.

Unattached promotions.

We cannot but come to the same conclusion, that seniority, tempered by rejection, must, in ordinary circumstances, govern promotion in the Marines; but we should be glad if a like reward for special merit could be granted to that force. The establishment of Marine officers, however, is so small that it is difficult to formulate a recommendation corresponding with that put forward by the Army Commissioners.

On the whole, we think that one unattached commission for both branches, irrespective of rank, might be granted by Her Majesty annually, on your Lordships' recommendation, for the purpose of rewarding individual officers of special merit and promise. We think that the appointment should be notified in the

"London Gazette," with your Lordships' minute of recommendation to Her Majesty attached thereto.

We think further, that the officer selected should be brought on to full pay as a vacancy may occur, but that in no case should he be kept on half pay beyond a limited period, to be fixed by your Lordships.

Duration of staff appointments.

77. The Order in Council of 4th August 1873 shortened the period, during which command and staff appointments might be held, from five to three years. We may observe, that the rule for the Army, definitely laid down in the new Warrant, accepts five years as the term for this class of appointment. We do not learn that any special advantage can be claimed for the shorter term, and we recommend that the rule of the Army should be adopted for the Marines.

Commencement of service.

78. We recommend that service for retirement, or gratuity, or pension, should only count, as in the Army, from 20 years of age completed.

79. Our attention has been called to the question of retiring quartermasters. There is no limit in the Army or Marines upon the time during which quartermasters may remain on active service. We think that the same means should be taken for securing the efficiency of this important class of officers as is adopted in the higher ranks, and that they should be retired at a given age.

80. We, however, forbear to make any recommendation upon the subject, because we understand that it is under the consideration of the Secretary of State for War, so far as the Army is concerned, and we think that his views should be ascertained before any specific measure of retirement is adopted for this grade of officer in the Marines.

81. The Army Warrant makes all staff officers supernumerary, and the same rule holds now generally in the Marines. There are, however, three lieutenants in the Infantry, assistant musketry instructors, and one lieutenant in the Artillery, assistant gunnery instructor, who are not supernumerary. For reasons previously stated, we are unwilling to advise any increase of the number of subalterns, except on proof of its absolute necessity, and we therefore confine ourselves to stating the fact for your Lordships' consideration.

General Officers.

82. We have reserved to the last our remarks on the regulations affecting general officers in the Marines.

Previous to the year 1854, there were no specific posts of that rank attached to the corps.

From the year 1760, indeed, there were certain titular generals and colonels of Marines drawing high pay. These appointments, however, were never bestowed upon officers of the Marines, but were reserved as sinecure rewards for naval officers. They were abolished on the recommendation of the Committee on Army and Navy Appointments, in 1833, and need no further notice.

Officers of the Marines had thus no higher post open to them than that of colonel commandant. It is true that they, like officers in other branches of the service, were promoted to the rank of general from time to time under periodical brevets, but such promotion was a mere titular distinction, carrying with it no chance of further employment, and previous to the year 1840 no emoluments. They were in fact retired on the pay of their last commissions.

In that year effect* was given to a recommendation of the Royal Commission on Naval and Military Retirement, and officers removed from the corps on becoming general officers were allowed to receive the full pay of their last regimental commission, or 400*l.* a year, when such full pay was of less amount.

In 1854 the system of creating general officers in the Army from time to time under periodical brevets was abolished in accordance with the recommendation of a Royal Commission,† and on the 13th of September of that year the Admiralty

* Order in Council of 12th August 1840.

† Report of the Royal Commission on Promotion in the Army (1854).

rally obtained an Order in Council abolishing periodical brevets also in the Marines, and empowering the Admiralty, with the consent of the Sovereign or the Commander in Chief, to exercise the power of appointing colonels of Marines to commands as major generals without reference to seniority.

This Order created for the first time a fixed establishment of general officers of Marines, 10 in number, of whom two might be generals, three lieutenant generals, and five major generals. It directed that vacancies on this fixed establishment should be filled by seniority, unless there were a supernumerary general created for brilliant service, or for having held a general's command, in which case such supernumerary should fill the vacancy; and, further, that general's commands and staff appointments should be held for five years only.

Provision was made in the Non-effective Navy Votes for the establishment of general officers thus created, in accordance with the precedent of unattached general officers in the Army.

Subsequently five colonelcies of divisions with 900 *l.* a year were created and given to general officers. Provision was latterly made for them on the Active Service Votes.

In 1867 an addition of three general officers was made to the fixed establishment.

The Order in Council of February 1870 reduced the number of general officers to 12, dividing them thus,—

For the Artillery branch	- 1 General - - - - }	3
	1 Lieutenant General - - }	
	1 Major General - - - }	
For the Infantry branch	- 2 Generals - - - - }	9
	2 Lieutenant Generals - - }	
	5 Major Generals - - - }	
		<hr/> 12 <hr/>

It directed that vacancies in each branch should be filled by the officers next on the list of that branch, except there be a supernumerary; that general officers should receive the pay of colonels commandant, and that they should retire from the service at the age of 70 on the pay of a colonel commandant, *i.e.*, on full pay. It provided six good-service pensions of 200 *l.* a year each, to be distributed among the general officers, whether on the active or retired list; and it abolished the post of colonel of division. These are the rules at present in force.

From April 1870 up to the present time one artillery general and four infantry generals have fallen under the compulsory retirement clause, and at the present moment there are—

3	Generals above the age of 65.
4	„ between 60 and 65.
5	„ under 60.

There is a difficulty in suggesting limits of age for active service in this rank of the Marines, because from the peculiar circumstances of the force general officers are practically never employed. We gather from the evidence taken before the Commission on Army and Navy Retirement in 1840, and before the Committee of the House of Commons, presided over by Mr. Childers in 1867, that there is no instance, since the peace, of a general officer being entrusted with a command. We must, however, add, that the Orders in Council, since the creation of the rank in 1854, have been drawn with a view to secure efficient generals. Thus the Order of 13th September 1854 states that the Lords of the Admiralty, with the sanction of Her Majesty, or of the Commander in Chief, are to exercise the power of appointing colonels of Marines to command as major generals, without reference to seniority. Again, power is given to the Admiralty to confirm the promotion of colonels of Marines who have held command with temporary rank as major generals.

These provisions certainly contemplate the possibility of employing Marine officers in generals' commands, and the provision of the Order in Council of 22nd February 1870, enforcing retirement of general officers at 70, implies that the establishment of generals is to be an efficient force.

We therefore hold that the established generals are to be regarded as an active body available for service in the field, and we have considered whether any modification of existing regulations is desirable either with the view of more completely attaining that end, or of securing a satisfactory flow of promotion in the upper ranks.

Upon these points we have to remark, that at the present moment the rate of promotion is satisfactory.

The junior general - - - -	in the Artillery is	54	years of age.
The colonel commandant - -	"	49	"
The colonel second commandant	"	51	"
The senior lieutenant-colonel -	"	49	"
The junior general - - - -	in the Infantry is	55	"
The senior colonel commandant	"	57	"
The senior colonel second commandant	"	55	"
The senior lieutenant-colonel -	"	52	"

This, however, will not be the case for long. We find that the ages in the upper ranks are such, that in all probability the present colonel commandant in the Marine Artillery will not become a general until the age of 64, and the present colonel second commandant will be retired for age at 65, not being then a general officer; while in the Infantry the present four colonels commandant will not become generals until the average age of 60, and such of the colonels second commandant as are not compulsorily retired, will not become general officers until 61 and later.

Bearing in mind that the Warrant regulating promotion and retirement in the Army will not permit promotion to the rank of general officer after the age of 55, we think that some further measures are necessary to secure the objects which we have in view.

We do not, however, think it advisable to apply the rule of retiring officers at 55 to the Marines. Under existing regulations unpromoted lieutenant-colonels are compelled to retire at 54, and unpromoted colonels at 60 years of age; and we should be glad to diminish rather than to increase the number of officers compulsorily retired at those ages. We recommend, therefore, that general officers should be retired at 65 instead of at 70 years of age as at present. This measure would undoubtedly have the effect of increasing the total number of generals, active and retired, who are on full pay; but that is not our object. Every general officer retired may be expected to save a colonel commandant, a colonel second commandant, or a lieutenant-colonel from compulsory retirement, and every such retirement will maintain the services of a physically efficient officer by withdrawing an officer who has reached the time of life when the majority of men are no longer fit for active service in the field. We think that this object would even justify some expenditure, and we believe, in fact, that the younger and more efficient officer can be retained in the service of the State at very little greater cost to the State than the older and less efficient officer. We learn from Mr. Finlaison that the retirement of general officers at 65 years of age would involve a final and normal increase of non-effective expenditure of 2,400 *l.* or 2,500 *l.* a year. Mr. Finlaison states that it is more expensive to grant pensions of 450 *l.* a year to a body of men at 54 years of age than pensions of 702 *l.* to their survivors at 65 years of age. To that extent, therefore, our proposal is economical. But, on the other hand, the proposal involves the retirement of generals at 65 who would only now retire at 70, and on the same pension of 702 *l.* This will cause increase of expenditure, the net result being as stated above. The active list would remain the same in all these cases. We venture to think that the State would be a gainer by retaining the services of the efficient officer at comparatively small cost to itself, and on these grounds we recommend the measure to the favourable consideration of your Lordships.

The Army Warrant reduces the number of active generals for the cavalry and infantry to 200. We have not proposed any reduction in the number of active generals of the Marines, because we find that, assuming 200 generals to be a fair proportion for the whole body of combatant officers in the cavalry and infantry below the rank of general, 12 is not more than a corresponding proportion

portion of generals for the Marines.* In the Artillery and Engineers the proportion of general officers is larger.

Date from which new Scheme should take effect.

83. The Army Warrant is to take effect from 1st October next, and we would suggest that any Order in Council regulating promotion and retirement in the Marines should take effect as from the same day. Date from which measure should take effect.

Recapitulation.

84. We proceed to recapitulate our suggestions. We recommend—

1. That first entries to the corps of Royal Marines be carefully regulated, and that a fixed number, to be determined on actuarial advice, be only admitted in each year, in order that the officers compulsorily retired on arriving at certain ages may be as few as possible. We believe that, if our proposals are adopted, 16 or perhaps 17† first appointments in each year would suffice for the whole force. This computation is based on the assumption that first entries will be made at 18 years of age. If the average age of entry is higher, more numerous appointments must be made. If, for instance, the average be 19, two extra appointments must be made in every three years.

2. That in the event of increase or diminution of establishment, care be taken to effect the changes on actuarial advice, and in the method least prejudicial to the ultimate interests of officers on the active list.

3. That the allowances now granted to officers on voluntary retirement be discontinued.

4. That your Lordships should be authorised to grant, if you think fit, and with the consent of the Treasury, gratuities to officers retiring voluntarily after 18 years of service, at the following rates:—

	£.
18 years - - - - -	2,000
20 years - - - - -	2,400

5. That such gratuities be only granted in order to reduce the number of officers compulsorily retired on 22 years of service, and that the number of first entries be not in consequence proportionately increased.

6. That the Admiralty be only empowered to grant retired allowances on less than 22 years of service upon the same conditions as are imposed on the War Office‡ by the 151st and 152nd articles of the recent Warrant, that awards of annuities on short service be only made in special cases with the consent of the Treasury; and further, that the rates of half pay and short service annuity be revised, so as to make them coincide with the principle of a pension of 200 *l.* at 40 years of age.

7. That the substantive rank of major be restored with the following pay and allowances, viz., 16 *s.* a day, and the regulated forage allowance, now usually 1 *s.* 10 *d.* a day.

8. That the establishment of the Infantry consist for the future of 24 majors and 72 captains, instead of 96 captains as at present; and that the establishment of the Artillery consist for the future of eight majors and 24 captains, instead of 32 captains as at present.

9. That

* If generals in the Marines bore the same proportion to the 265 combatant officers that 200 generals of the cavalry and infantry bear to the 5,397 combatant officers, including unattached colonels, of those branches there would be 18·5 Marine generals.

† 10½ for the Infantry.
2½ for the Artillery.
1½ or 2½ to provide for casualties.

16 or 17

‡ See Appendix.

9. That captains who have not attained the rank of major before completing the following periods of service in all ranks, or of age, be retired on a pension of 225 *l.* a year :—

Until 31st December 1878, 23 years' service, or 43 years of age.

From 1st January 1879, 22 years' service, or 42 years of age.

10. That majors, if allowed to retire before they have completed 22 years of service, be granted the same terms as captains retiring voluntarily (recommendation 4), and that majors who have served more than 22 but less than 25 years, if allowed to retire, be granted a pension of 225 *l.*

11. That majors who have completed 25 years of service, if allowed to retire, be granted a pension of 260 *l.*

12. That majors who have not attained the rank of lieutenant-colonel before completing 28 years of service, or 48 years of age, be retired on a pension of 300 *l.* a year.

13. That the number of lieutenant-colonels on the Artillery establishment be increased from three to four.

14. That lieutenant-colonels, if allowed to retire with less than 28 years of service, be granted the same terms as majors allowed to retire (recommendations 10 and 11).

15. That lieutenant-colonels, if allowed to retire from the corps on 28 years and less than 30 years' service, be granted the same terms as majors under recommendation 12.

16. That lieutenant-colonels, if allowed to retire on 30 years' service, be granted a pension of 365 *l.* a year. That officers who entered the Royal Marines before 1st April 1870, be allowed to count service for the purpose of this pension from the date of their commission.

17. That lieutenant-colonels, who have not been promoted to the rank of colonels second commandant before completing 34 years of service, or 54 years of age, be retired upon a pension of 450 *l.*

18. That colonels second commandant be retired on completing 40 years of service, or 60 years of age, with a pension of 600 *l.* a year.

19. That colonels commandant, either on attaining 60 years of age or at the expiration of their command, be retired with a pension of 600 *l.* a year, and that the list of reserved colonels be abolished.

20. That general officers be retired at 65 years of age on the full pay of a colonel commandant.

21. That the duration of staff appointments and commands be for five instead of three years.

22. That service for purposes of gratuity, pension, and retirement, count from 20 years of age completed.

23. That one unattached commission be granted by Her Majesty annually for the purpose of rewarding officers of special merit and promise.

24. That the detailed estimate of Marine non-effective expenditure be drawn so as to show clearly and separately the officers retired under Orders in Council prior to 1870, and those retired under the Order in Council of 1870, and subsequent Orders; that short service annuities and half pay be shown under separate heading, the former being distinguished from the latter; and that a note of the amount payable on account of commuted allowances be appended.

25. That any Order in Council founded on this report take effect as from 1st October next.

Cost.

Cost.

85. It remains for us only to lay before your Lordships an estimate of the cost, immediate and ultimate, which our recommendations involve.

Taking six years as a sample period, we find that, under existing regulations, between the 1st October 1877 and the 31st December 1883,

5 Generals, 10 Colonels commandant,	|	3 Lieutenant-colonels, and *23 Captains
--	--	--

will have been compulsorily retired, whereas under our scheme, within the same period,

7 Generals, 2 Colonels commandant,	|	1 Lieutenant-colonel, and 19 Majors
---------------------------------------	--	--

will have been similarly retired.

In addition to these officers 58 captains will have been retired under that part of our scheme which removes them, if unpromoted, at 42 years of age.

This estimate shows both schemes working at the slowest rate of which they admit, no allowance being made for deaths or casualties.

The removal of so many captains at 42 will be the main cause of expense, and it will tell heavily at first, because of the block now existing.

86. We have much difficulty in calculating the non-effective charge of the corps at the close of the six years to which the foregoing figures relate. For the current year it is 68,000*l.*, and we should anticipate that in 1884 it would probably amount to 80,000*l.*; but we would at the same time point out that, *under existing regulations*, there would be a considerable increase within that period.

87. The immediate cost of the changes which we propose in the effective force is as follows :—

	£.
1. Pay and forage allowance of 32 majors replacing 32 captains, half of whom are already brevet majors -	2,500
2. An additional lieutenant-colonel of Artillery, including forage allowance - - - - -	360
3. Half pay of one unattached commission, say - -	200
	<hr/>
	3,060
Say - -	<hr/> 3,000

Forecast of the cost of the scheme in 1883 as compared with the present cost.

Adding this sum to the sum of 80,000*l.*, mentioned above, we arrive at a total increase of about 15,000*l.* beyond present cost.

88. Pensions will form the main item of increased cost, and the increase on them will of course be gradual. In the year now coming it will be very small.

89. We have thought it right to endeavour to lay before your Lordships some forecast of the immediate financial effect of our proposals, but we feel the difficulty of making a trustworthy estimate for specific years where the data are so uncertain. We turn, therefore, with more confidence to the computation which Mr. Finlaison has made for us of the cost of our scheme when arrived at full development, and in complete working order.

He calculates that our proposals, in full working order, would tend to produce the following normal pension list :—

17 Generals.
5 Lieutenant-colonels.
47 Majors.
140 Captains.
<hr/>
209 Officers, costing 59,500 <i>l.</i> ,

or 13½ per cent. above the present charge.

The

* These captains would be majors if our proposals are adopted.

REPORT ON PROMOTION AND RETIREMENT

The following tables compare the cost of our scheme, (1) with the cost involved in existing regulations, (2) with the estimate for the current year :—

TABLE 1.

Retired Pay List.

	Normal future Cost.	Normal Cost of existing Regulations.
	£.	£.
	59,500	52,300
To this sum must be added a short service annuity list and a half-pay list (say 80 or 90 officers), costing about - - -	7,000	7,000
12 generals unattached - - -	8,500	8,500
Total non-effective (say), 310 officers, costing - - -	75,000	68,000 for 250 officers.
Add, increased effective charge stated on previous page - - 3,060 l., say	3,000	—
Total normal cost - - -	78,000	68,000
Normal increase under our scheme - - -	£. 10,000	

TABLE 2.

Comparison with Estimate of 1877-78.

Charge on Estimates of 1877-78 (say) - -	£.
Normal charge under our scheme - - -	68,000 for 296 officers.
	78,000 for 310 officers.
Increase of our scheme developed—	
Over present Estimate - - -	10,000

Alternative form
of stating the cost.

90. We frame the foregoing estimate on the model of the Navy Estimates, which make provision for the active establishment of generals on the non-effective votes. We think, however, that the following statement shows more correctly the effect of our proposals :—

Active List.

Active establishment of 365 officers as borne on the	£.
Estimates of the current year* - - - -	65,600
12 active generals - - - -	8,500
Total - - - -	74,100
Add, addition which we propose - - - -	3,000
Total Active List (say) - - -	77,000

A reference to paragraph 6 will show that if the present force of 14,000 men were officered at the same cost proportionately as the force of 9,000 men maintained in 1838, the charge on the Estimates would be 77,000 l.

Non-effective

* This calculation does not include the pay of the deputy adjutant general, usually a colonel, and of the assistant adjutant general, usually a lieutenant-colonel, who are supernumeraries by Order in Council.

Non-effective List.

91. Our proposals entail a normal pension list, costing	-	-	-	-	£.	59,500
Add half-pay and short service annuity list	-	-	-	-		7,000
Normal cost	-	-	-	-	-	66,500
Normal cost of existing regulations	-	-	-	-	£.	52,300
Half-pay and short service annuities	-	-	-	-	7,000	
						59,300
Normal increase of the non-effective list	-	-	-	-	-	7,200
Add increase of active list (say)	-	-	-	-	-	3,000
Total eventual increase over cost involved in existing regulations (say)	-	-	-	-	-	10,000
92. The annual charge of the non-effective lists for 1877-78 is	-	-	-	-		68,000
Deduct cost of active generals	-	-	-	-	-	8,500
Net cost	-	-	-	-	-	59,500
As compared with the eventual non-effective cost involved in our proposals of	-	-	-	-	-	66,500
Increase	-	-	-	-	-	7,000
Add increase of active list (say)	-	-	-	-	-	3,000
Total eventual increase over present cost	-	-	-	-	-	10,000

93. The addition of the deputy and assistant adjutants general, mentioned in the note to paragraph 90, makes no increase, but rather a diminution in the non-effective charge. They tend indeed to increase the number of retired generals and lieutenant-colonels, but, on the other hand, they save majors from retirement.

94. If your Lordships should think fit to make the subalterns, mentioned in paragraph 81, supernumerary, the number and cost of the active establishment will be proportionately increased, and an addition will be made also to the normal non-effective charge, amounting to about 800*l.* a year. Mr. Finlaison has given us a statement of the normal non-effective list, including the deputy and assistant adjutants general and these subalterns. It will be found in his memorandum dated 5th August, at the close of the Appendix.

95. We cannot, however, but hope that a somewhat stricter administration may effect a reduction in the half-pay and short service annuity lists.

96. We may notice that the effective and non-effective pay of the Marine officers will thus amount to a sum of rather more than 140,000*l.* a year. The force is in round numbers 14,000 strong. Thus the Marines will be officered at a total cost of about 10*l.* a head a year.

97. It must be remembered that our calculations are based upon the assumption that officers will enter the Marines at the average age of 18. If the average age be higher, the cost of retirement will also be higher; and it may be roundly stated that, for each increased year of age, a normal increase of non-effective expenditure, amounting to about 3,000*l.*, will be incurred. If at any time additional supernumerary officers are created, it will affect our calculations, and we would suggest that on every such occasion the advice of the actuary be taken, and the calculations of normal cost amended.

98. We would add, that Mr. Finlaison has adopted in his calculations a rate of mortality somewhat higher than that ascertained in the case of male Government annuitants, for the reason, in which we concur, that officers in Her Majesty's service are exposed to risks of war and climate.

99. Your Lordships are aware that Parliament has voted, in the Estimates of the

the current year, 1,000*l*.* to meet the possible charge of improved promotion, and 5,000*l*.* to meet the possible charge of increased retirement, or 6,000*l*. in all. We have, of course, excluded this contingent grant from our statements of the actual cost of the Marines at the present time.

Conclusion.

100. In concluding our report, we wish to repeat that the scheme of retirement introduced in 1870 is working satisfactorily, that it needs extension, not alteration of principle, and that we have directed our proposals to that object.

101. Believing that the scheme which we lay before you will secure sufficient flow of promotion, we wish to add our opinion that compensation on voluntary retirement should be carefully guarded, that it should be well understood in the force that no man has a right to it, and that your Lordships should only grant it in order to save compulsory retirement, which would otherwise be inevitable.

102. We are afraid that for some time the senior lieutenants will be of greater age and longer service than is desirable. It is difficult, however, to remedy at once the mischief caused by injudicious first appointments in former years. Our proposals already involve a great number of compulsory retirements, and we are unwilling to increase them. We think then that, as the prospects of the officers, including lieutenants, will be generally and considerably improved, time must be allowed for the gradual reduction of service in the lieutenants rank to the approved periods.

103. Our best thanks are due to Sir Francis Festing, assistant adjutant general, for the valuable assistance which we have received from him in the prosecution of the inquiry which you have entrusted to us. We have also to express our obligations to Mr. Finlaison, the actuary of the National Debt Office, for the reports which he has furnished on various points submitted to him.

We have, &c.
(signed) *R. E. Welby,*
G. B. Rodney, Colonel and D.A.G.
T. James.

10 August 1877.

* Navy Estimates, 1877-78, pp. 9 and 207.

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APPENDIX, No. 1.

NUMBER of OFFICERS of the ROYAL MARINES on RETIRED PAY or HALF PAY, or who have Commuted their PENSIONS or HALF PAY, with the Charge of the same in each Year, from 1870-71 to 1877-78, inclusive.

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY on the date of the Order in Council of 22nd February 1870.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY,	£. s. d.		LIGHT INFANTRY.	£. s. d.
1	Lieutenant-General - - -	730 - -	1	General - - -	702 12 6
3	Major-Generals - - -	2,190 - -	1	Lieutenant-General - - -	821 5 -
—	Colonel - - -	—	26	Major-Generals - - -	16,642 10 -
3	Lieutenant-Colonels - - -	520 2 6	1	Colonel - - -	264 12 6
3	Majors - - -	438 - -	27	Lieutenant-Colonels - - -	8,682 10 -
15	Captains - - -	2,094 3 9	4	Majors - - -	675 5 -
11	Lieutenants - - -	872 19 2	110	Captains - - -	18,142 19 7
			89	Lieutenants - - -	6,460 10 -
			5	Quartermasters - - -	912 10 -
36	£.	6,845 5 5	264	£.	53,304 14 7

	£.	s.	d.
36 Artillery - - -	6,845	5	5
264 Infantry - - -	53,304	14	7
300	£. 60,150	-	-*

* Exclusive of five General Officers, being Colonels of Divisions, with 900 £ a year each.

No additions were made to the charge for the Non-effective Lists between the 22nd February 1870 and 31st March 1870, as the Order in Council did not take effect until the 1st April 1870, and all Retirements were suspended.

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY, in the Year 1871.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - -	1,630 - -	4	Generals - - -	3,402 12 6
1	Lieutenant-General - - -	730 - -	3	Lieutenant-Generals - - -	2,423 17 6
3	Major-Generals - - -	2,190 - -	24	Major-Generals - - -	15,237 5 -
—	Colonel - - -	—	1	Colonel - - -	264 12 6
1	Lieutenant-Colonel - - -	133 16 8	27	Lieutenant-Colonels - - -	8,769 17 6
3	Majors - - -	438 - -	3	Majors - - -	547 10 -
15	Captains - - -	2,217 7 6	88	Captains {Including one late Paymaster} - - -	14,964 19 2
8	Lieutenants - - -	608 6 8	79	Lieutenants - - -	5,794 7 6
			4	Quartermasters - - -	730 - -
33		7,947 10 10	233		52,105 1 8
4	Commuted Retired Pay - - -	438 - -	27	Commuted Retired Pay - - -	3,181 11 8
37	£.	8,385 10 10	260	£.	55,286 13 4

	£.	s.	d.
37 Artillery - - -	8,385	10	10
260 Infantry - - -	55,286	13	4
297	63,672	4	2
Additional Sum for Leap Year - - -	143	18	6†
	£. 63,816	2	8

† Inclusive of five General Officers, late Colonels of Divisions, still in receipt of 900 £ a year each.

APPENDIX, No. 1—continued.

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY,
in the Year 1872.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - - -	1,680 - -	4	Generals - - - -	3,402 12 6
1	Lieutenant-General - -	730 - -	3	Lieutenant-Generals - -	2,423 17 6
3	Major-Generals - - -	2,190 - -	23	Major-Generals - - -	14,534 12 6
—	Colonel - - - -	—	2	Colonels - - - -	564 12 6
—	Lieutenant-Colonel - -	—	30	Lieutenant-Colonels - -	9,299 9 2
3	Majors - - - -	438 - -	5	Majors - - - -	803 - -
12	Captains - - - -	1,815 17 6	69	Captains - - - -	11,698 5 -
6	Lieutenants - - - -	465 7 6	68	Lieutenants - - - -	5,037 5 10
			4	Quartermasters - - -	730 - -
27		7,269 5 -	208		48,498 15 -
7	Commuted Retired Pay -	781 14 2	44	Commuted Retired Pay -	5,908 17 1
34	£.	8,050 19 2	252	£.	54,402 12 1

	£. s. d.
34 Artillery - - - -	8,050 19 2
252 Infantry - - - -	54,402 12 1
286	£. 62,453 11 3

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY,
in the Year 1873.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - - -	1,680 - -	4	Generals - - - -	3,402 12 6
1	Lieutenant-General - -	730 - -	3	Lieutenant-Generals - -	2,423 17 6
4	Major Generals - - -	2,920 - -	22	Major-Generals - - -	14,134 12 6
—	Colonel - - - -	—	4	Colonels - - - -	1,969 17 6
1	Lieutenant-Colonel - -	152 1 8	30	Lieutenant-Colonels - -	9,289 4 2
4	Majors - - - -	860 18 4	12	Majors - - - -	2,304 - -
11	Captains - - - -	1,682 - 10	66	Captains - - - -	11,265 5 -
6	Lieutenants - - - -	465 7 6	65	Lieutenants - - - -	4,827 2 6
			4	Quartermasters - - -	730 - -
29		8,440 8 4	210		50,296 11 8
10	Commuted Retired Pay -	1,080 11 8	66	Commuted Retired Pay -	7,315 9 7
39	£.	9,521 - -	266	£.	57,612 1 3

	£. s. d.
39 Artillery - - - -	9,521 - -
266 Infantry - - - -	57,612 1 3
305	£. 67,133 1 3

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY, in the Year 1874.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - - -	1,630 - -	4	Generals - - - -	3,402 12 6
1	Lieutenant-General - -	730 - -	3	Lieutenant-Generals - -	2,423 17 6
4	Major-Generals - - -	2,920 - -	20	Major-Generals - - -	12,729 7 6
1	Colonel - - - -	300 - -	4	Colonels - - - -	1,969 17 6
3	Lieutenant-Colonels - -	585 18 4	33	Lieutenant-Colonels - -	10,405 7 6
4	Majors - - - -	860 18 4	10	Majors - - - -	2,034 - -
10	Captains - - - -	1,461 10 5	53	Captains - - - -	6,810 15 5
6	Lieutenants - - - -	465 7 6	54	Lieutenants - - - -	3,995 7 6
			4	Quartermasters - - -	730 - -
31		8,953 14 7			46,501 5 5
10	Commutated Retired Pay -	1,080 11 8	185	Commutated Retired Pay -	9,422 15 -
			67		
41	£.	10,034 6 3	252	£.	55,924 - 5

	£. s. d.
41 Artillery - - - -	- - 10,034 6 3
252 Infantry - - - -	- - 55,924 - 5
293	£. 65,958 6 8

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY, in the Year 1875.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - - -	1,620 - -	4	Generals - - - -	3,402 12 6
1	Lieutenant-General - -	730 - -	3	Lieutenant-Generals - -	2,423 17 6
4	Major-Generals - - -	2,920 - -	20	Major-Generals - - -	12,729 7 6
2	Colonels - - - -	675 - -	4	Colonels - - - -	1,969 17 6
3	Lieutenant-Colonels - -	585 18 4	34	Lieutenant-Colonels - -	10,595 2 6
6	Majors - - - -	1,360 18 4	16	Majors - - - -	3,141 10 -
9	Captains - - - -	1,327 13 9	47	Captains - - - -	7,895 7 1
6	Lieutenants - - - -	474 10 -	48	Lieutenants - - - -	3,595 5 -
			4	Quartermasters - - -	730 - -
33		9,704 - 5			46,482 19 7
11	Commutated Retired Pay -	1,214 8 4	180	Commutated Retired Pay -	10,428 13 4
			76		
44	£.	10,918 8 9	256	£.	56,911 12 11

	£. s. d.
44 Artillery - - - -	- - 10,918 8 9
256 Infantry - - - -	- - 56,911 12 11
300	£. 67,830 1 8

APPENDIX, No. 1—continued.

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY in the Year 1876.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - -	1,630 - -	4	Generals - - -	3,402 12 6
1	Lieutenant-General - - -	730 - -	3	Lieutenant-Generals - - -	2,226 10 -
3	Major-Generals - - -	2,190 - -	18	Major-Generals - - -	11,661 15 -
3	Colonels - - -	976 - -	4	Colonels - - -	1,567 5 -
7	Lieutenant-Colonels - - -	1,852 1 8	33	Lieutenant-Colonels - - -	10,278 19 2
3	Majors - - -	535 18 4	20	Majors - - -	3,921 6 8
8	Captains - - -	1,193 17 1	41	Captains - - -	6,981 2 1
6	Lieutenants - - -	474 10 -	46	Lieutenants - - -	3,476 2 6
			4	Quartermasters - - -	730 - -
33		9,631 7 1	173		44,245 12 11
11	Commutated Retired Pay - -	1,214 8 4	81	Commutated Retired Pay - -	11,473 8 4
44	£.	10,845 15 5	254	£.	55,719 1 3

	£. s. d.
44 Artillery - - - - -	10,845 15 5
254 Infantry - - - - -	55,719 1 3
298	66,564 16 8
Additional Sum for Leap Year - - -	110 8 8
	£. 66,675 5 4

CHARGE for RETIRED PAY of the ROYAL MARINE ARTILLERY and ROYAL MARINE LIGHT INFANTRY, in the Year 1877.

Nos.	RANK.	AMOUNT.	Nos.	RANK.	AMOUNT.
	ARTILLERY.	£. s. d.		INFANTRY.	£. s. d.
2	Generals - - -	1,630 - -	5	Generals - - -	4,105 5 -
1	Lieutenant-General - - -	730 - -	3	Lieutenant-Generals - - -	2,226 10 -
3	Major-Generals - - -	2,190 - -	18	Major-Generals - - -	11,661 15 -
4	Colonels - - -	1,575 - -	3	Colonels - - -	864 12 6
5	Lieutenant-Colonels - - -	1,252 1 8	38	Lieutenant-Colonels - - -	12,297 14 2
5	Majors - - -	1,013 - -	17	Majors - - -	3,331 5 -
8	Captains - - -	1,193 17 1	38	Captains - - -	6,514 4 2
5	Lieutenants - - -	389 6 8	45	Lieutenants - - -	3,412 15 -
			4	Quartermasters - - -	730 - -
38		9,973 5 5	171		45,144 - 10
12	Commutated Retired Pay - -	1,299 11 8	84	Commutated Retired Pay - -	11,855 8 4
45	£.	11,272 17 1	255	£.	56,999 9 2

	£. s. d.
45 Artillery - - - - -	11,272 17 1
255 Infantry - - - - -	56,999 9 2
300	68,272 6 3
Additional Sum for anticipated additional Retirements - - -	5,000 - -
	£. 73,272 6 3

APPENDIX, No. 2.

AMOUNT OF HALF PAY AND RETIRED SUPERANNUATION ALLOWANCES OF ROYAL MARINE OFFICERS
from 1809-10 to 1877-78.

N.B.—This Statement is taken from the Report of the Committee on Finance 1828, and from the Report of the Committee on Army, Navy, and Ordnance Expenditure up to 1848, after that date from the Annual Estimates.

Year.	Amount.	Year.	Amount.	Year.	Amount.	Annuity representing commuted Pensions.
	£. s. d.		£. s. d.		£. s. d.	£.
1810	30,097 4 1	1833	48,234 14 2	1856	50,954 1 3	—
1811	34,091 7 9	1834	46,373 19 —	1857	57,455 16 3	—
1812	29,641 17 —	1835	49,788 — 10	1858	55,653 17 6	—
1813	29,375 11 6	1836	47,827 1 8	1859	54,575 15 —	—
1814	30,330 1 3	1837	46,979 13 4	1860	54,192 15 10	—
1815	65,704 17 2	1838	55,078 10 —	1861	56,308 7 7	—
1816	77,678 16 1	1839	50,008 19 2	1862	55,466 4 1	—
1817	81,466 8 1	1840	54,918 16 3	1863	51,549 10 —	—
1818	82,707 1 2	1841	52,357 7 6	1864	55,731 5 10	—
1819	79,548 12 4	1842	50,253 10 5	1865	54,836 14 2	—
1820	77,910 13 11	1843	50,336 11 3	1866	55,873 18 4	—
1821	76,300 2 5	1844	48,248 9 3	1867	56,499 — —	—
1822	77,681 4 —	1845	48,199 — 5	1868	56,373 — —	—
1823	71,065 15 2	1846	46,603 7 11	1869	52,531 — —	—
1824	63,270 — 6	1847	48,512 17 6	1870	60,216 — —	—
1825	61,288 13 8	1848	47,587 7 11	1871	60,150 — —	—
1826	58,748 15 2	1849	48,184 12 6	1872	60,226 — —	3,620
1827	56,185 15 10	1850	47,840 10 —	1873	55,763 — —	6,090
1828	54,175 13 6	1851	49,673 5 9	1874	58,737 — —	8,396
1829	51,973 14 2	1852	46,720 1 3	1875	54,456 — —	10,503
1830	50,797 9 5	1853	46,519 1 3	1876	56,187 — —	11,643
1831	50,297 18 11	1854	47,959 8 3	1877	53,877 — —	12,688
1832	48,617 10 8	1855	50,336 11 3	1878	55,117 — —	13,155

APPENDIX, No. 3.

NUMBER OF OFFICERS OF THE ROYAL MARINES ON RETIRED PAY AND ON HALF PAY ON THE
1st January in each Year from 1809 to 1877 inclusive.

Year.	Retired Full Pay.	Half Pay.	TOTAL.	Year.	Retired Full Pay.	Half Pay.	TOTAL.
1809	63	331	394	1844	89	353	442
1810	61	323	384	1845	88	346	434
1811	61	337	398	1846	85	366	451
1812	63	335	398	1847	83	335	418
1813	62	339	401	1848	84	336	420
1814	61	346	407	1849	83	338	421
1815	75	400	475	1850	83	312	395
1816	86	363	449	1851	91	310	401
1817	88	381	469	1852	95	297	392
1818	82	322	404	1853	101	292	393
1819	77	346	423	1854	103	263	366
1820	75	316	391	1855	106	264	370
1821	72	303	375	1856	85	238	323
1822	71	263	334	1857	109	224	333
1823	66	280	346	1858	105	216	321
1824	58	242	300	1859	104	199	303
1825	58	242	300	1860	111	202	313
1826	54	219	273	1861	110	189	299
1827	52	250	302	1862	96	183	279
1828	51	236	287	1863	100	184	284
1829	49	210	259	1864	93	179	272
1830	47	235	282	1865	95	169	264
1831	48	272	320	1866	99	165	264
1832	48	268	316	1867	92	151	243
1833	48	254	302	1868	93	149	241
1834	48	238	286	1869	85	139	224
1835	64	239	303	1870	95	195	290
1836	64	229	293	1871	94	187	281
1837	64	227	291	1872	93	172	265
1838	96	211	307	1873	106	178	284
1839	102	298	400	1874	130	149	279
1840	97	283	380	1875	131	147	278
1841	92	276	368	1876	138	143	281
1842	91	274	365	1877	142	138	280
1843	91	261	352				

N.B.—This Return is taken from the lists in the Marine Office; the numbers vary from those given in Appendix 1, because 1, the Active Generals are excluded, and 2, the Marine Office receives earlier information of deaths than the office of the Accountant General by which Appendix No. 1 was prepared, and the lists in the former are therefore more correct.

APPENDIX, No. 4.

RETURN of the NUMBER of FIRST APPOINTMENTS OF OFFICERS to the ROYAL MARINES,
in each of the following Years :—

Year.	No.	Year.	No.	Year.	No.
1840 - - -	5	1853 - - -	17	1865 - - -	25
1841 - - -	35	1854 - - -	57	1866 - - -	19
1842 - - -	28	1855 - - -	65	1867 - - -	24
1843 - - -	9	1856 - - -	13	1868 - - -	14
1844 - - -	11	1857 - - -	10	1869 - - -	8
1845 - - -	13	1858 - - -	16	1870 - - -	8
1846 - - -	18	1859 - - -	77	1871 - - -	6
1847 - - -	22	1860 - - -	27	1872 - - -	6
1848 - - -	54	1861 - - -	13	1873 - - -	7
1849 - - -	28	1862 - - -	26	1874 - - -	15
1850 - - -	12	1863 - - -	15	1875 - - -	4
1851 - - -	11	1864 - - -	28	1876 - - -	38
1852 - - -	14				

APPENDIX, No. 5.

NUMBER of OFFICERS retired from the ROYAL MARINES in consequence of ILL-HEATH to whom
SHORT SERVICE ANNUITIES or HALF PAY were awarded during the Six Years ended 31st
March 1877.

There are 17 officers on these lists who have retired since 1st April 1871 on account of ill-health.

3 retired on account of disease of the heart.	1 retired on account of weakness of knee-joint.
1 " " consumption.	1 " " effect of a wound.
2 " " unsound mind.	2 " " sea sickness.
2 " " deafness.	3 " " syphilis.
1 " " defective vision.	1 " " paralysis (since dead).

The average service of these officers was rather over five years.

APPENDIX, No. 6.

EXTRACT from the Royal Warrant, dated 13th August 1877, showing the Regulations in the Army
for the Grant of Half Pay to Officers incapacitated by Ill-health.

Articles 151, 152.

151. An officer who may become unfit for service in consequence of wounds received in action, or of ill-health contracted in and by the performance of military duty, as certified by a Medical Board, may be granted temporary half-pay until he shall recover, and until an opportunity shall occur for his re-employment. Except in the case of wounds received in action, the officer must, however, have served with a commission in Our Regular Army for three years, unless he shall have been promoted from the ranks, when one year's service only as a Commissioned Officer shall be required. In special cases in which the circumstances may appear to Our Secretary of State to call for exceptional consideration, it shall be sufficient that the disability shall have been contracted in the service.

152. In the case of an Officer placed upon temporary half-pay in consequence of injuries caused in and by the service, Our Secretary of State may, provided a Military Medical Board report that the Officer is unfit for further service, place such Officer upon permanent half-pay, after not less than one year upon temporary half-pay. In special cases in which the circumstances may appear to Our Secretary of State to call for exceptional consideration, it shall be sufficient that the disability shall have been contracted in the service.

APPENDIX, No. 7.

The RETIRED FULL PAY LIST of the ROYAL MARINES as fixed at different Times.

RANK.	In 1792.	Order in Council, 30 April 1834.	Order in Council, 21 June 1837.	Order in Council, 10 Aug. 1840.	Order in Council, 13 Sept. 1854.	Order in Council, 22 Feb. 1870.
Generals - - -	-	-	-	-	Fixed numbers of retirements abolished, and annual sum of 35,000 <i>l.</i> granted instead.	All limits on full pay retired lists abolished.
Colonels Commandant -	1	2	8	8		
" 2nd " - -	-	-	2	2		
Lieutenant Colonels -	1	3	4	6		
Majors - - -	1	3	-	-		
Captains - - -	18	20	25	25		
1st Lieutenants - -	6	10	10	10		
2nd " - -	3	10	-	-		
	25	48	49	51		

APPENDIX, No. 8.

STATEMENT of VARIATIONS in the ESTABLISHMENT of ROYAL MARINES (Officers and Men) from the Year 1783 to 1877 inclusive.

In the year 1783, at the close of the American War, the Establishment was	23,817
But in the year 1784 it was reduced to a peace footing of	4,495
At the commencement of the French War in 1793 this number was increased to	9,800
And in 1815 it had reached, by annual additions	31,400
From 1816 to 1819 the Establishment was	6,000
From 1820 to 1822	8,000
In 1823	8,700
From 1824 to 1841	9,000
From 1842 to 1846	10,500
From 1847 to 1849	12,000
From 1850 to 1852	10,547
In 1853	12,500
From 1854 to 1856 during the Russian War the Establishment was	15,500
In 1857 and 1858 the Establishment was	14,500
In 1859	16,500
From 1860 to 1864	18,000
In 1865	17,000
In 1866 and 1867	16,400
In 1868	14,700
In 1869	14,000

And has continued at that number until the present time (1877).

APPENDIX, No. 9.

RETURN showing the DATE and EXTENT of AUGMENTATIONS and REDUCTIONS of OFFICERS of the ROYAL MARINES.

Date of Order in Council.	Augmentations and Reductions.
23 February 1831	- 1 Lieutenant Colonel reduced; 7 Captains and 2 Subalterns added.
10 " 1832	- 4 Captains and 2 Subalterns added.
12 April - 1832	- 4 Colonels 2nd Commandant and 2 Subalterns added.
30 " - 1834	- 15 Captains and 10 Subalterns reduced.
21 June - 1837	- 5 Lieutenant Colonels added; 9 Majors reduced and rank abolished; 12 Captains and 4 Subalterns reduced.
8 May - 1841	- 1 Lieutenant Colonel and 5 Captains added, 8 Subalterns reduced.
13 January 1845	- 2 Captains and 8 Subalterns added.
10 March 1846	- ditto - - - ditto.
24 April - 1847	- 3 Captains and 12 Subalterns added.
22 July - 1847	- 1 Lieutenant Colonel, 6 Captains, and 12 Subalterns added.
8 May - 1848	- 2 Lieutenant Colonels, 12 Captains, and 24 Subalterns added.
5 February 1850	- 10 Captains and 20 Subalterns reduced.
30 January 1854	- 1 Lieutenant Colonel, 11 Captains, and 24 Subalterns added.
28 February 1855	- 3 Captains and 8 Subalterns added.
21 Nov. - 1855	- 1 Captain reduced.
2 February 1857	- 1 Colonel 2nd Commandant added.
12 April - 1859	- 3 Captains and 2 Subalterns added.
30 " - 1859	- 2 Lieutenant Colonels, 10 Captains, and 24 Subalterns added.
22 October 1859	- 1 Colonel Commandant and 1 Subaltern added.
22 February 1860	- 5 Captains and 12 Subalterns added.
18 May - 1865	- 9 Captains added; 20 Subalterns reduced.
3 August 1867	- 21 Captains reduced; 70 Second Captains created; 33 Subalterns reduced.
17 March 1869	- 1 Colonel Commandant, 5 Lieutenant Colonels, 19 Captains, 28 Second Captains, and 42 Subalterns reduced.
4 August 1873	- 29 Captains added; 42 Second Captains reduced and rank abolished; 20 Subalterns reduced.

APPENDIX, No. 10.

ROYAL MARINE LIGHT INFANTRY.

ABSTRACTS OF RETIREMENTS.

These Tables show the retirements, &c., which would occur from 1st October 1877, under the operation of the respective systems.

No allowance is made for death or other casualty. Paymasters will probably be appointed from retiring Captains, and will therefore not give steps.

TABLE 1.—PRESENT REGULATIONS. NUMBER of OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Reserved Colonels.	Colonels Commandant (to Reserved List).	Lieut.-Colonels.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
1877 (from 1 October) -	—	—	—	—	—	—	<i>Years. Mos.</i> 35 6
1878 - - - - -	—	—	1	2	2	5	35 9
1879 - - - - -	—	—	1	1	3	5	35 4
1880 - - - - -	1	—	3	—	1	3	37 4
1881 - - - - -	1	—	1	—	3	3	37 2
1882 - - - - -	2	—	—	—	1	1	37 11
1883 - - - - -	—	—	2	—	9	11	38 1
1884 - - - - -	2	—	1	—	6	7	39 2
1885 - - - - -	—	—	—	4	11	15	38 8
1886 - - - - -	—	—	2	1	12	15	38 10
1887 - - - - -	—	—	1	1	3	5	39 5
1888 - - - - -	—	2	—	—	7	7	39 6
1889 - - - - -	—	1	2	—	8	10	40 5
1890 - - - - -	3	—	1	—	16	17	36 4
1891 - - - - -	2	—	1	1	7	9	33 5
1892 - - - - -	4	—	1	2	7	11	34 7
1893 - - - - -	—	—	—	3	11	14	35 11
TOTAL - - -	15	3	17	15	107	138	—

Note 1 (to Table 1).—There are in this Table 157 retirements, &c., in ranks above that of Subaltern, while there are only 138 steps to Subalterns. The reasons for this difference are as follows:—The vacancies created by Generals retiring are, in 14 cases out of 15, filled by Reserved Colonels (i.e., Colonels Commandant who are placed on the Reserved List, after being three years in command or on attaining the age of 60, but succeed to the rank of General as vacancies occur, if not 65 years of age); 3 Reserved Colonels are retired at the age of 65; 1 Supernumerary Colonel Commandant and 1 Supernumerary Captain are absorbed; in each of which cases no Subaltern receives a step.

Note 2.—A similar Table to the above has been worked out to the year 1894, but assuming that Colonels Commandant hold their appointments for 5 instead of 3 years, the general result of which is the same. The differences are that two fewer Colonels Commandant are placed upon the Reserved List, only 1 Reserved Colonel is retired instead of 3, and 1 more Captain is retired. There are the same number of retirements in the other ranks, and the total number of steps to Subalterns during the whole 17 years is 138, the same as under the 3-yearly period of command.

TABLE 2.—Assuming that Colonels Commandant will hold their appointments for 5 years, the creation of Majors, and compulsory retirement of Captains at 40 years of age, from 1st October 1877, but graduated at first, as proposed in Draft Warrant (1877) on promotion and retirement in the Army.

NUMBER of OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Colonels Commandant.	Lieut.-Colonels.	Majors.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
1877 (from 1 October) -	—	—	—	—	1	1	<i>Years. Mos.</i> 34 3
1878 - - - - -	—	—	3	2	4	9	34 4
1879 - - - - -	—	—	1	2	14	17	34 1
1880 - - - - -	1	3	1	1	16	20	34 1
1881 - - - - -	1	1	—	3	14	17	33 11
1882 - - - - -	2	2	—	—	15	17	33 0
1883 - - - - -	—	2	—	4	5	11	23 8
1884 - - - - -	2	—	—	2	5	7	29 6
1885 - - - - -	—	—	3	2	11	16	27 8
1886 - - - - -	—	—	2	1	6	9	28 7
1887 - - - - -	—	1	1	—	15	17	(say) 29 3
TOTAL - - -	6	9	11	17	106	141	—

APPENDIX, No. 10.—ROYAL MARINE LIGHT INFANTRY—ABSTRACTS OF RETIREMENTS—*cont^d*.

TABLE 3.—Assuming that Colonels Commandant will hold their appointments for 5 years, the creation of Majors, and compulsory retirement of Captains at 43 years of Age, from 1st October 1877.

No allowance is made for death or other casualty.

NUMBER of OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Colonels Commandant.	Lieutenant Colonels.	Majors.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
							<i>Yrs. Mos.</i>
1877 (from 1 Oct.)	—	—	—	—	1	1	34 3
1878	—	—	3	2	4	9	34 4
1879	—	—	1	2	3	6	35 2
1880	1	3	1	1	8	12	35 1
1881	1	1	—	3	10	14	35 5
1882	2	2	—	—	3	5	35 9
1883	—	2	—	4	6	12	36 7
1884	2	—	—	3	5	8	37 1
1885	—	—	3	4	9	15	37 2
1886	—	—	2	3	3	8	36 5
1887	—	1	1	1	7	10	33 4
1888	—	2	2	—	10	14	31 9
1889	—	—	—	2	9	11	32 9
1890	2	2	—	6	8	16	(say) 32 3
TOTAL	8	13	13	31	86	141	—

Note 1 (to Tables 2 and 3).—These Tables show respectively 149 and 151 retirements above the rank of Subaltern and only 141 steps to Subalterns. The explanation is that the whole of the vacancies caused by Generals retiring are filled by Reserved Colonels (*vide* Note to Table 1); and the absorption of 2 Supernumerary Officers is also taken into account.

Note 2.—In 1880, one of the 3 Colonels Commandant shown is a Colonel 2nd Commandant. In 1888 (Table 3) one Reserved Colonel is removed to the Retired List on attaining the age of 65, but, such removal giving no step, he is not mentioned.

TABLE 4. PROPOSED REGULATIONS:—Assuming the abolition of the Reserved Colonels' List, the creation of 24 Majors, and compulsory retirement of General Officers at 65 years of age, Colonels Commandant at 60 years of age or at the expiration of 5 years command, Colonels Second Commandant at 60 years of age, Lieutenant Colonels at 54, Majors at 48, and Captains at 43 years of age up to 31st December 1878, and after that date at 42 years of age; which are the recommendations of the Committee.

NUMBER of OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Colonels Commandant.	Lieutenant Colonels.	Majors.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
							<i>Yrs. Mos.</i>
1877 (from 1 Oct.)	4	—	—	—	1	5	34 9
1878	—	—	—	—	4	4	34 11
1879	2	—	—	2	14	18	34 1
1880	—	—	—	2	11	13	34 8
1881	—	—	—	4	3	6	34 9
1882	—	1	—	3	6	10	35 5
1883	—	—	1	4	6	11	35 6
1884	—	3	3	1	7	14	35 0
1885	3	—	2	—	5	9	35 5
1886	2	—	—	—	7	9	31 6
1887	4	—	—	—	11	15	30 9
1888	1	—	—	—	9	10	30 7
1889	—	—	—	2	16	18	(say) 31 2
TOTAL	16	4	6	18	100	142	—

Note to Table 4.—This Table shows 144 retirements above the rank of Subaltern and only 142 steps to Subalterns. The difference, 2, is accounted for by allowance being made for the absorption of a Supernumerary General and a Supernumerary Captain; no steps being given to Subalterns in their places.

APPENDIX, No. 10—continued.

ROYAL MARINE ARTILLERY.

ABSTRACTS OF RETIREMENTS.

1. Under present Regulations.
2. Assuming the abolition of the Reserved Colonels' List, the increase of Lieutenant-Colonels from 3 to 4, the creation of 8 Majors, and compulsory retirement of General Officers at 65 years of age, Colonels Commandant at 60 years of age or at the expiration of 5 years' command, Colonels Second Commandant at 60 years of age, Lieutenant Colonels at 54, Majors at 48, and Captains at 43 years of age up to 31st December 1878, and after that date at 42 years of age; which are the recommendations of the Committee.

These Tables show the retirements, &c. which would occur from 1st October 1877, under the operation of the respective systems. No allowance is made for death or other casualty,

TABLE 1.—PRESENT REGULATIONS. NUMBER OF OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Reserved Colonels.	Colonels Commandant (to Reserved List).	Lieut.-Colonels.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
							<i>Yrs. Mos.</i>
1877 (from 1 Oct.)	—	—	—	—	—	—	29 9
1878	—	—	—	—	—	—	30 9
1879	—	—	—	—	1	1	30 7
1880	—	—	1	—	—	1	31 3
1881	1	—	—	—	1	—	32 3
1882	—	—	—	—	1	1	33 9
1883	—	—	1	—	1	1	34 5
1884	—	—	—	1	3	3	35 6
1885	—	—	—	—	1	1	36 8
1886	—	—	1	—	3	4	36 11
1887	—	—	—	1	2	3	35 3
1888	—	—	—	—	2	2	34 11
1889	—	—	1	—	6	7	34 4
1890	—	—	—	—	7	7	33 1
1891	1	1	—	—	4	3	33 2
1892	—	—	1	—	2	3	34 3
1893	2	—	—	—	—	—	35 3
1894	—	—	—	1	1	2	36 0
1895	—	—	1	—	1	2	(say) 35 6
TOTAL	4	1	6	3	36	41	—

Note 1 (to Table 1).—It will be seen that in this Table there are 50 retirements in ranks above that of Subaltern, while there are only 41 steps to Subalterns. This difference, 9, is accounted for as follows:—The vacancies created by the retirement of the 4 Generals shown are filled by Reserved Colonels (i.e., Colonels Commandant who are placed on the Reserved List after being 3 years in command or on attaining 60 years of age, but succeed to the rank of General as vacancies occur, if not 65 years of age); 1 Reserved Colonel is retired at the age of 65; 1 Supernumerary Lieutenant-Colonel and 2 Supernumerary Captains are absorbed; and 1 Supernumerary Captain is retired; in each of which cases no Subaltern receives a step.

Note 2.—A similar Table to the above has been worked out to the year 1895, but assuming that Colonels Commandant hold their appointments for 5 instead of 3 years, which gives the following results:—Retirements of Generals and Reserved Colonels, the same number; Colonels Commandant placed on Reserved List, 2 less; 1 more Lieutenant-Colonel and 1 more Captain retire; and the total number of Steps to Subalterns during the 19 years is 41, the same as under the 3 yearly period of command.

TABLE 2.—PROPOSED REGULATIONS. COMPULSORY RETIREMENT OF GENERALS at 65, and of CAPTAINS at 42. NUMBER OF OFFICERS retiring in each Grade in each of the following Years.

YEAR.	Generals.	Colonels Commandant.	Lieut.-Colonels.	Majors.	Captains.	Steps to Subalterns.	Age of Senior Subaltern on 31st December.
							<i>Yrs. Mos.</i>
1877 (from 1 Oct.)	1	—	—	—	—	1	28 7
1878	—	—	—	—	—	—	29 7
1879	—	—	—	—	2	2	30 9
1880	—	—	—	—	3	2	30 4
1881	—	—	—	3	1	3	32 8
1882	—	1	—	—	2	3	32 0
1883	—	—	—	1	5	5	30 3
1884	—	—	1	1	6	8	29 4
1885	—	—	2	—	2	3	28 11
1886	1	1	—	—	1	3	28 1
1887	—	—	—	—	—	—	29 1
1888	2	—	—	—	—	2	31 2
1889	—	—	—	—	1	1	32 2
1890	—	—	—	1	2	3	32 3
1891	—	—	—	2	5	7	(say) 31 6
TOTAL	4	2	3	8	30	43	—

Note (to Table 2).—This Table shows 47 retirements above the rank of Subaltern and only 43 steps. The difference, 4, is caused thus:—Of the 4 Generals retired, 1 absorbs a Reserved Colonel (*vide* Note to Table 1); a Supernumerary Major and a Supernumerary Captain retire; and 2 Supernumerary Captains become absorbed; a step, however, is given in 1877 by the addition of a Lieutenant-Colonel.

APPENDIX, No. 11.

At the Court at Windsor, the 13th day of November 1858.

PRESENT :—The Queen's Most Excellent Majesty in Council.

WHEREAS there was this day read at the Board a Memorial from the Right Honourable the Lords Commissioners of the Admiralty, dated the 11th of November 1858, in the words following, viz. :—

Whereas we consider it expedient to submit to Your Majesty a revision of Your Majesty's Order in Council of 13th September 1854, regulating the promotion and retirement of Officers in Your Majesty's Royal Marine Forces, and we would therefore venture most humbly to lay before Your Majesty the following propositions :—

1. That there shall be a fixed establishment of 10 General Officers of Royal Marines, viz. :—
 2 Generals.
 3 Lieutenant-Generals.
 5 Major-Generals.

For alterations, see
Order in Council,
22/2/70.

2. That every vacancy on the fixed list of General Officers be filled by the Senior Lieutenant-General, or Major-General, or by the Senior Colonel on the serving strength of the Corps, unless there should be a Supernumerary Officer, in which case the supernumerary shall fill the vacancy.

3. That, in addition to the Colonels promoted to be Major-Generals under the above rule, Colonels of Marines shall be eligible for promotion to the rank of Major-General, either for brilliant service in the field or afloat, or in consequence of having held commands with temporary rank as Major-Generals for five years during peace, or for any shorter period during war which may appear to the Lords Commissioners of the Admiralty, with the sanction of Your Majesty, to give a just claim to have their temporary rank made permanent.

4. That the Lords Commissioners of the Admiralty, with the sanction of Your Majesty, and the concurrence of the Commander in Chief of the Forces, should exercise the power of appointing Colonels of Marines to commands as Major-Generals, and of selecting Officers of Marines for special service abroad, and give such local rank or promotion by Brevet to such Officers as their merits may appear to require, and that Colonels and Lieutenant-Colonels may be selected to serve as Field Officers of Marines embarked in the Fleet, without reference to seniority.

5. That the rank of Colonel be given to Officers after serving *five* years with the rank of Lieutenant-Colonel in the Corps, or on the Staff in situations held by Lieutenant-Colonels.

6. That the rank of Colonel be given to Officers who obtain the rank of Brevet Lieutenant-Colonel for services in the field, after *eight* years actual service in that rank.

7. That any Captain or Lieutenant-Colonel of Marines may be rewarded by Brevet promotion for distinguished service in the field or afloat; but no Officer receiving such promotion shall be permitted to exchange Brevet promotion for substantive rank, except for conspicuously distinguished services, and the recommendation in which the services of the Officers shall be detailed shall be published in the London Gazette.

8. That no Officer who held Brevet rank, and was considered eligible, under the 11th clause of Your Majesty's Order in Council of 13th September 1854, to have that rank converted into substantive rank, can any longer retain that privilege; but a Captain and Brevet Field Officer, while continuing in command of his company, shall receive the pay of Major, *i. e.*, an increase of 2*s.* 5*d.* a day, and if reduced to half-pay shall receive 9*s.* 6*d.* a day, the half pay of Major.

9. That the command of a General Officer or of a division of Marines, and situations on the Staff of the Corps, should not be held for more than five years, except by re-appointment.

10. That command of Divisions may be given, without reference to seniority, to Officers holding the rank of Colonel, whose services and qualifications best justify their selection.

11. The Deputy Adjutant-General not to be of rank inferior to that of Colonel. The Assistant Adjutant-General not to be of rank inferior to that of Lieutenant-Colonel. Two Officers of the Royal Marines to hold appointments of Aides-de-Camp to Your Majesty, to be selected from the rank of Lieutenant-Colonel, and promoted to the rank of Colonel.

For alterations, see
Order in Council,
22/2/70.

12. The retired full-pay list being fixed for the Marines at 35,000*l.* for the retirement of Officers of all ranks in the Corps, the selection shall be made by the Lords Commissioners of the Admiralty for long and meritorious services, and impaired health.

13. Colonels Second Commandant, upon relinquishing the prospect of succeeding to command of Divisions, shall be permitted to retire on 25*s.* a-day.

Cancelled by Order
in Council, 22/2/70.

14. Lieutenant-Colonels of not less than 30 years' service will be permitted to retire on 20*s.* a-day, and those of shorter service, and Officers of inferior rank, on their regimental pay.

15. Paymasters and Barrack Masters of the Royal Marines, after 30 years' service, including at least seven years as Pay or Barrack Master, shall be permitted to retire on 15*s.* a-day. If retired after shorter service from impaired health, to receive 11*s.* 6*d.* a-day.

For alterations, see
Order in Council,
22/2/70.

16. Each Officer placed on the full-pay retired list shall receive a step of honorary rank, together with the pay of the rank from which he retired, or the special rates above sanctioned, but such Officer cannot be further promoted.

Cancelled by Order
in Council, 22/2/70.

17. Officers commanding Divisions of Royal Marines shall be required to retire therefrom on attaining the age of 60, unless the Lords Commissioners of the Admiralty are satisfied that the discipline and condition of the Division are such as to prove that it would be advantageous to the service for the Colonel Commandant to continue in command of it for the regulated period.

18. The names of all Officers who may retire on full pay to be printed in *italics*.

Should Your Majesty be graciously pleased to approve of these suggestions, we would further most humbly recommend that the same shall take effect from the 14th October 1858, the date of Your Majesty's Royal Warrant regulating the promotion and retirement of Officers in the Army and Ordnance Corps.

Her Majesty having taken the said Memorial into consideration, was pleased, by and with the advice of Her Privy Council, to approve of what is therein proposed; and the Right Honourable the Lords Commissioners of the Admiralty are to give the necessary directions herein accordingly.

(signed) *Wm. L. Bathurst.*

At the Court at Windsor, the 22nd day of February 1870.

PRESENT :—The Queen's Most Excellent Majesty in Council.

WHEREAS there was this day read at the Board a Memorial from the Right Honourable the Lords Commissioners of the Admiralty, dated the 19th of February 1870, in the words following, viz. :—

Whereas we are of opinion that it will greatly tend towards the efficiency of Your Majesty's Service were We empowered to introduce certain alterations into the existing system of promotion and retirement of Officers in Your Majesty's Royal Marine Forces. We would, therefore, venture to submit to Your Majesty the following propositions :—

That the system of compulsory retirement be extended to all the higher grades, so as to cause a more even and constant flow of promotion ;

That a scheme of retirement be established on a scale more liberal than that now existing, and more duly proportioned to the length of the service of Officers.

Should Your Majesty be pleased to approve of these Our propositions, We would humbly submit that the same should take effect from the 1st April 1870.

As relates to Officers of the Royal Marines.

1. There shall be a fixed establishment of 12 General Officers of Royal Marines, to be appointed as follows :—

To the Artillery Branch:

1 General.
1 Lieutenant General.
1 Major General.

—
3

To the Infantry Branch:

2 Generals.
2 Lieutenant Generals.
5 Major Generals.

—
9

2. Every vacancy on the fixed list of General Officers in each branch to be filled, as the case may be, by the Senior Lieutenant General or Major General of that branch, or by the Senior Colonel of that branch on the reserved list, or by the Senior Colonel on the serving strength of that branch of the corps, unless there shall be a Supernumerary Officer, in which case the Supernumerary to fill the vacancy.

3. The appointment of Colonel of Division to be abolished.

4. Compulsory retirement to be extended to all ranks.

	To be Retired at	May Retire at	
General Officers - - -	70	- - -	} To be retired at any age at Our discretion if found physically unfit to serve.
Reserved Colonels Commandant -	65	- - -	
Colonels other than Commandants	60	54	
Lieutenant Colonels - - -	54	48	
Paymasters and Barrack Masters holding Brevet or Honorary rank.	54	48	
Captains - - - - -	48	42	

5. All officers to be retired irrespective of age, at Our discretion, if physically unfit to serve.

6. Power to be reserved to Us, to suspend at any time, and with respect to any rank, the provisions of the order under which an Officer may at his option retire, at an age less than that fixed for compulsory retirement in each rank.

7. Officers retired at an age earlier than that fixed for optional retirement to receive such rates of retired pay as We may deem proper in each case, not being less in amount than the sum fixed as the maximum for the next lower grade.

8. An Officer placed upon the retired list in no case to be replaced on the active list.

9. An Officer placed on the retired list may receive a step of honorary rank at his own request, and with Our consent.

10. General Officers to be retired on the full pay of a Colonel Commandant.

11. Reserved Colonels Commandant to be retired on 600 l. a year.

12. All other Officers retired to receive retired pay according to the following scale, subject to the provisions contained in Clause 14 :—

Age.	Retired Pay.	Number of Years' Service.	Age.	Retired Pay.	Number of Years' Service.
	£.			£.	
60	600	40	50	425	30
59	585	39	49	400	29
58	570	38	48	375	28
57	555	37	47	350	27
56	540	36	46	325	26
55	525	35	45	300	25
54	510	34	44	275	24
53	495	33	43	250	23
52	475	32	42	225	22
51	450	31			

13. A deduction to be made of 10 l. for each year wanting to complete the periods of service specified in the above scale, except in the case of Officers placed on half-pay in order to effect the reduction of the lists. These Officers to be allowed to count such time on half-pay as full service for retirement.

REPORT ON PROMOTION AND RETIREMENT

14. The maximum retired pay for the following Officers not to exceed the sums stated against each rank:—

Colonel	-	-	-	-	-	-	-	-	-	£.
Lieutenant Colonel	-	-	-	-	-	-	-	-	-	600
Paymaster	} with brevet or honorary rank	-	-	-	-	-	-	-	-	450
Barrack-master		-	-	-	-	-	-	-	-	450
Captain	-	-	-	-	-	-	-	-	-	300

15. Good service pensions to be six in number, and to be distributed amongst General Officers, whether on the active or retired list. These pensions to be of the value of 200 *l.* a year each, and to be held for life. The emoluments of the officers at present holding the appointment of Colonels of Divisions to be deemed to include Good Service Pensions.

16. A General Officer to receive the pay of Colonel Commandant.

17. A Colonel Commandant, either on attaining 60 years of age, or at the expiration of his command, to be placed on a reserved list with the pay of 600 *l.* per annum; and, while on that list, to be eligible for promotion to the fixed list of General Officers in his turn. If he attains the age of 65 without being so promoted, to be removed to the retired list.

18. An Officer retired may, at his own request, and with Our consent, compound his retired pay under the rules laid down by the Lords Commissioners of Your Majesty's Treasury for Administering Act 32 & 33 Vict. cap. 32.

19. No pension, except a pension for wounds, can be compounded.

20. General Officers now on the List to be retired at 70 on retired pay, equal in amount to their present emoluments, but not to receive a Good Service Pension in addition to their emoluments as Colonel of a Division.

21. Colonels Commandant now on the List whose command dates from on or before 27th July 1867, to receive, when placed on the reserved list, the amount of their present pay.

22. Captains now on the List of 25 years' service not to be compulsorily retired until the age of 50; and Paymasters and Barrack-masters now holding such appointments not to be compulsorily retired until the age of 60.

All present rules and regulations, except in so far as they are altered or limited by these general or temporary provisions, shall be deemed to remain in force.

We beg leave to represent to Your Majesty that the Lords Commissioners of Your Majesty's Treasury have sanctioned the expenditure which may be incurred.

Her Majesty having taken the said memorial into consideration, was pleased, by and with the advice of Her Privy Council, to approve of what is therein proposed. And the Right Honourable the Lords Commissioners of the Admiralty are to give the necessary directions herein accordingly.

At the Court at Osborne House, Isle of Wight, the 5th day of February 1872.

PRESENT:—The Queen's most Excellent Majesty in Council.

WHEREAS there was this day read at the Board a Memorial from the Right Honourable the Lords Commissioners of the Admiralty, dated the 29th of December 1871, in the words following, viz. :—

"Whereas Your Majesty was, by Your Order in Council of 22nd February 1870, most graciously pleased to sanction certain alterations in regard to the retirement of Officers in Your Majesty's Royal Marine Forces, whereof the effect is that service will not reckon for retirement until after 20 years of age: And whereas we are of opinion that the Regulations in respect of age should be modified in favour of those Officers who entered the Royal Marine Forces previous to the 1st April 1870, the day on which by Your Majesty's Order in Council before mentioned, the said Regulations came into force: And whereas we deem it expedient, with the view of increasing the efficiency of Your Majesty's Royal Marine Forces, to provide, as a temporary measure, for the Retirement upon Annuities of a limited number of Officers whose services are not of sufficient length to bring them within the scale established by Your Majesty's Order in Council aforesaid: We do, therefore, most humbly submit that Your Majesty will be pleased to sanction, with reference to the aforesaid Officers, the following modifications and temporary extension of the aforesaid Order in Council:—

"1. That all Officers who entered the Royal Marines before 1st April 1870, and who obtained their first Commission before attaining 18 years of age, be allowed to reckon their service for retirement from the age of 18; those who entered at or after 18 years of age, to reckon their service from the date of their first Commission, but the maximum rates of retired pay, fixed by Clause 14 of the aforesaid Order in Council, shall, under no circumstances, be exceeded.

"2. That until the Royal Marine Forces shall be reduced to numbers proportionate to the requirements of Your Majesty's Service, we be authorised to permit Officers of 12 years' service or upwards to retire permanently, if we see fit, upon Annuities in accordance with the following Scale:—

	Annuity.		Annuity.
	£.		£.
" After Service on Full-Pay for—		" 17 years	148
" 12 years	89	" 18 "	161
" 13 "	99	" 19 "	176
" 14 "	110	" 20 "	191
" 15 "	122	" 21 "	208
" 16 "	135	" 22 "	225

"3. That we be permitted to extend to any Colonel Commandant, whose Command dates prior to 1st April 1870, when placed on the Reserved List, the advantage of receiving the amount of his present rate of pay. The Lords Commissioners of your Majesty's Treasury have signified their concurrence with these proposals."

Her Majesty, having taken the said Memorial into consideration, was pleased, by and with the advice of Her Privy Council, to approve of what is therein proposed. And the Right Honourable the Lords Commissioners of the Admiralty are to give the necessary directions herein accordingly.

(signed) *Arthur Helps.*

At the Court at Osborne House, Isle of Wight, the 4th day of August 1873.

Present :—The Queen's most Excellent Majesty in Council.

WHEREAS there was this day read at the Board a Memorial from the Right Honourable the Lords Commissioners of the Admiralty, dated the 2nd August 1873, in the words following, viz. :—

"Whereas we consider it expedient to extend to the Royal Marines the improved rates of Full and Half Pay, granted by your Majesty's Royal Warrants of the 28th December 1871, and the 17th February 1872, to Lieutenants in the Army; and whereas we propose, at the same time, to make certain other changes in the Corps (hereafter described) which we are of opinion will be very advantageous to the Service; we humbly beg that Your Majesty will be graciously pleased to authorise us to issue the following regulations :—

" Lieutenants.

"Full and Half Pay to be assimilated to the Full and Half Pay of Officers of the Army, authorised by the Royal Warrants of 28th December 1871 and 17th February 1872, viz. :—

" Full Pay.

"For Officers whose Commissions date after the 1st November 1871.

	Artillery.	Infantry.
	<i>s. d.</i>	<i>s. d.</i>
" Lieutenant—		
" Under 3 years' service - - -	5 7 a day.	5 3 a day.
" After 3 years' service - - -	6 10 "	6 6 "
" After 10 years' service - - -	7 10 "	7 6 "

"For Officers who hold that rank on the 31st October 1871.

	Artillery.	Infantry.
	<i>s. d.</i>	<i>s. d.</i>
" Lieutenant - - - - -	6 10 a day.	6 6 a day.
" After 7 years' service in that rank, or after 10 years' service from date of first Commission - - - - -	7 10 "	7 6 "

Half Pay.

	Artillery.	Infantry.
	<i>s. d.</i>	<i>s. d.</i>
" Lieutenant - - - - -	3 2 a day.	3 - a day.
" After 3 years' service in that rank -	4 2 "	4 - "
" After 10 years' service in that rank -	4 8 "	4 6 "

"To take effect from 1st April 1872.

"Lieutenants who retire with less than 3 years' service will be granted *temporary Half Pay* only, as follows :—

	Half Pay
" After 2 years' service as Commissioned Officer - - - - -	for 3 years.
" After 1 year's service as Commissioned Officer - - - - -	for 2 years.
" Under 1 year's service as Commissioned Officer - - - - -	for 1 year.

"In cases of misconduct lower rates than those prescribed may be awarded, according to the circumstances.

" Captains.

"All Captains of 8 years' standing, while embarked in Her Majesty's ships, to have the temporary rank of Major, in order to place them on an equality with Lieutenants of the Royal Navy of the same standing, and during such time to receive the extra pay of 2*s.* a day allowed to Brevet Majors; such rank and pay to be retained when Officers and Men are temporarily landed from the Fleet for drill, or other duty, or when landed for warlike operations as part of a combined force of Seamen and Marines under the command of a Naval Officer, but not in cases where the Marines are acting with Her Majesty's Land Forces.

"The present Second Captains to be promoted, and the rank of Second Captain to be abolished.

" Barrack Masters,

"Instead of being paid according to length of service, as at present, viz. :—

" From date of appointment to completion of 25 years' service in the Corps -	<i>s. d.</i> 7 6 a day.
" From 25 to 30 years' service - - - - -	10 - "
" For 30 and upwards - - - - -	15 - "

"Exclusive of Half-pay as Captain.

REPORT ON PROMOTION AND RETIREMENT

"Barrack Masters in future appointments to be paid the uniform rate of 10 s. 6 d. a day, exclusive of their Half-pay as Captains, and to receive no increase for length of service.

"All Barrack Masters, including those at present serving, to have the honorary rank of Major, instead of confining it to those of seven years' standing and twenty years in the Corps, as laid down by the Order in Council of the 16th April 1861.

"Staff.

"Appointments of Commandants of Divisions and other Staff appointments, except those of

- "Paymasters,
- "Barrackmasters, and
- "Quartermasters,

to be limited to three years, instead of five, as prescribed by the Order in Council of the 13th November 1858; but this rule not to be compulsory on Officers who at present hold such appointments.

"Commandants on completing their period of command, to have the option of retiring on 600*L* a year, with honorary rank of Major General, instead of taking their places on the list of Reserved Colonels, as prescribed by the Order in Council of 22nd February 1870.

"A Staff College Officer (Captain or Lieutenant) to be appointed as Military Instructor for the Artillery and Infantry Divisions at Portsmouth, in lieu of one of the Adjutants of the Marine Artillery.

"Adjutants in future to be Lieutenants; but the Captains at present holding these appointments will retain them for the period regulated by former Orders in Council.

"General Establishment.

"A reduction of 9 Captains and 24 Lieutenants of Infantry to be made in the present Establishment, sanctioned by the Order in Council of the 17th March 1869, and the future re-distribution of the Royal Marine Corps to be as stated in the accompanying Scheme.

"Such reduction to be effected by filling every alternate vacancy only in the Captains' List by promotion of a Subaltern, until the fixed Establishment be reached."

RE-DISTRIBUTION OF THE ROYAL MARINE FORCES.

THE ROYAL MARINE ARTILLERY.

To be composed of—	Staff.
16 Companies, each consisting of—	1 Colonel Commandant.
2 Captains (with or without Brevet rank).	1 Colonel Second Commandant.
3 Lieutenants.	3 Lieutenant Colonels.
2 Colour Sergeants.	1 Paymaster.
9 Sergeants.	1 Barrackmaster.
8 Corporals.	1 Staff Surgeon.
7 Bombardiers.	2 Surgeons.
*3 Buglers.	3 Gunnery Instructors. (Captains with or without Brevet rank.)
143 Gunners.	1 Musketry Instructor. (Captain with or without Brevet rank.)
	1 Staff Captain. (With or without Brevet rank.)
	1 Military Instructor. (Captain with or without Brevet rank, or Lieutenant; a Staff College Officer.)
	1 Adjutant. (Lieutenant.)
	3 Quartermasters.
	2 Sergeants Major.
	3 Schoolmasters.
	1 Bandmaster.
	3 Quartermaster Sergeants.
	1 Barrack Sergeant.
	1 Chief Clerk, Adjutant's Office.
	1 Chief Clerk, Paymaster's Office.
	3 First Class Serjeant Instructors of Gunnery.
	1 First Class Serjeant Instructor of Musketry.
	1 First Serjeant Instructor of Infantry.
	1 Drum Major.
	1 Bugle Major.
	1 Provost Serjeant.
	1 Hospital Serjeant.
	1 Master Tailor.
	1 Serjeant, Officers' Mess.
	1 Armourer Serjeant.

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THE ROYAL MARINE LIGHT INFANTRY.

To be composed of	Staff.
+ 48 Companies, each consisting of—	3 Colonels Commandant.
2 Captains (with or without Brevet rank).	4 Colonels Second Commandant; 1 for service at the Depôt.
3 Lieutenants.	12 Lieutenant Colonels.
2 Colour Sergeants.	4 Paymasters; 1 for service at the Depôt.
11 Sergeants.	4 Barrackmasters; 1 for service at the Depôt.
12 Corporals.	3 Staff Surgeons.
*5 Buglers.	6 Surgeons.
191 Privates.	3 Gunnery Instructors. (Captains with or without Brevet rank.)
	4 Musketry Instructors. (Captains with or without Brevet rank); 1 for service at the Depôt.
	7 Adjutants. (Lieutenants); 1 for service at the Depôt.
	7 Quartermasters; 1 for service at the Depôt.
	7 Sergeants Major; 1 for service at the Depôt.
	10 Schoolmasters; 4 for service at the Depôt.
	3 Bandmasters.
	7 Quartermaster Sergeants; 1 for service at the Depôt.
	4 Barrack Sergeants; 1 for service at the Depôt.
	4 Chief Clerks, Adjutants' Offices; 1 for service at the Depôt.
	4 Chief Clerks, Paymasters' Offices; 1 for service at the Depôt.
	3 First Class Serjeant Instructors of Gunnery.
	4 First Class Serjeant Instructors of Musketry; 1 for service at the Depôt.
	4 First Serjeant Instructors of Infantry; 1 for service at the Depôt.
	4 Drum Majors; 1 for service at the Depôt as Drum and Bugle Major.
	3 Bugle Majors.
	4 Provost Sergeants; 1 for service at the Depôt.
	3 Hospital Sergeants.
	4 Master Tailors; 1 for service at the Depôt.
	4 Sergeants, Officers' Messes; 1 for service at the Depôt.
	4 Armourer Sergeants; 1 for service at the Depôt.

226

133

* 25 Musicians to be borne additional for Service in Band.

+ Chatham 16, Portsmouth 16, Plymouth 16.
175 Musicians to be borne additional for service in Band.

Making the whole Establishment	{ Of Royal Marine Artillery - - - - 2,901
	{ Of Royal Marine Light Infantry - - - - 11,656
	{ Deputy Adjutant General - - - - 1
	{ Assistant Adjutant General - - - - 1
	{ Quartermaster (for special duties), (Royal
	{ Marine Office) - - - - 1
	{ Sub-Inspector of Schools - - - - 1
	{ Chief Clerk (Royal Marine Office) - - - - 1
	{ Clerks, Staff Sergeants (Royal Marine
	{ Office) - - - - 3
The General Staff of the Corps to consist of - - - -	
	TOTAL Establishment - - - - 13,965 "

Her Majesty having taken the said memorial into consideration, was pleased, by and with the advice of Her Privy Council, to approve of what is therein proposed; and the Right Honourable the Lords Commissioners of the Admiralty are to give the necessary directions herein accordingly.

(signed) *Edmund Harrison.*

APPENDIX, No. 12.

MEMORANDUM of Mr. Finlaison, the Actuary of the National Debt Office, on various Proposals for improving the Rate of Promotion and Retirement in the Royal Marines.

I. By Order in Council of 4th August 1873, the Establishments of the two branches of the Royal Marines, including gunnery instructors, musketry instructors, and adjutants, &c., are at present constituted as follows:—

GRADE.	Number of Officers.			Age for Compulsory Retirement.	Rate of Pension.
	Artillery.	Infantry.	TOTAL.		
General - - - - -	9	9	12	70	£. 730 and 702 l. 12 s. 6 d. 600 600 450 300 —
Colonel Commandant - -	1	3	4	65	
Colonel 2nd Commandant - -	1	4	5	60	
Lieutenant Colonel - - -	3	12	15	54	
Captain - - - - -	38	103	141	48	
Lieutenant - - - - -	49	151	200	—	
	95	282	377		

Under the above regulations it is found that, if lieutenants were appointed at the age of 18 years, there would be an ultimate tendency towards the subjoined pension list and rate of promotion and retirement. In the statement now given it will be seen that the numbers in the two branches of the service have been consolidated; but it should be remarked that, in all the calculations made for the purposes of the present investigation, due weight has been given to the fact that promotion in each branch is independent of the rate of advancement in the other.

STATEMENT showing the probable Effect of the present Establishment of the Royal Marines.

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
General - - - - -	before 60	1.4	.88	£. 5,300	7 or 8
Colonel Commandant - -	57	1.55	—	—	—
Colonel 2nd Commandant - -	54	1.64	—	—	—
Lieutenant Colonel - - -	48	2.62	.68	5,220	11 or 12
Captain - - - - -	before 35	11.17	6.69	41,780	139 or 140
Lieutenant - - - - -	18	13.02	—	—	—
			8.25	52,300	

In the above forecast no allowance has been made for voluntary retirements.

II. The probable effect of a system under which unpromoted lieutenants would be retired at 32 years of age, in an establishment constituted in other respects as at present, would be as understated. The rate of pension for retired lieutenants being 150 l. a year, an amount which it is computed would call for the same ultimate annual rate of expenditure that 200 l. a year would require, if it were granted to the survivors of such a body of pensioners from and after the age of 40 years.

STATEMENT showing the probable Effect of the Compulsory Retirement of Unpromoted Lieutenants at 32 Years of Age, on 150 l. a Year, in a Corps constituted in other respects as at present.

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
General - - - - -	before 60	1.4	.88	£. 5,300	7 or 8
Colonel Commandant - -	57	1.55	—	—	—
Colonel 2nd Commandant - -	54	1.64	—	—	—
Lieutenant Colonel - - -	48	2.62	.68	5,220	11 or 12
Captain - - - - -	32	9.62	5.18	32,360	107 or 108
Lieutenant - - - - -	18	15.09	3.68	17,450	115 or 116
			10.42	60,330	

It is found that the annual charge for pensions would be increased by the above plan in the proportion of 115½ to 100. The augmentation of cost being due to the larger number of annual appointments and consequent retirements under such a scheme.

III. It is next desired to investigate the probable effect of an arrangement under which 32 Majors would be created out of the 141 Captains on the establishment; unpromoted Captains being retired at 40 years of age,

REPORT ON PROMOTION AND RETIREMENT

age, on 200 l. a year, Majors at 48, on 300 l. a year, and Lieutenant Colonels and Officers of higher rank, at the same age and rate of pension as at present.

Under the above-mentioned circumstances it is found that there would be an ultimate tendency towards the following state of affairs :—

STATEMENT showing the probable Effect of a proposed Establishment in which Majors would Retire at 48 Years of Age and Captains at 40 Years of Age.

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
General - - - - -	before 60	1.4	.88	£. 5,300	7 or 8
Colonel Commandant - - - - -	57	1.55	—	—	—
Colonel 2nd Commandant - - - - -	54	1.64	—	—	—
Lieutenant Colonel - - - - -	48	2.62	.68	5,220	11 or 12
Major - - - - -	40	4.2	1.11	6,930	23 or 24
Captain - - - - -	before 32	13.53	8.2	42,740	213 or 214
Lieutenant - - - - -	18	15.42	—	—	—
			10.87	60,190	

It is computed that the above scheme would increase the annual charge for pensions in the proportion of 115 on 100.

IV. The probable effect of the following establishment in the Royal Marines is the next in order for review, namely :—

GRADE.	Number of Officers.	Age for Compulsory Retirement.	Rate of Pension.
General - - - - -	12	70	£. 730 & 702 12/6
Colonel - - - - -	9	60	600
Lieutenant Colonel - - - - -	15	54	450
Major - - - - -	32	48	300
Captain - - - - -	109	42	225
Lieutenant - - - - -	200	—	—
377			

It is found that the above regulations would have an ultimate tendency towards the following results, viz. :—

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
General - - - - -	before 60	1.4	.88	£. 5,300	7 or 8
Colonel - - - - -	54	1.64	—	—	—
Lieutenant Colonel - - - - -	48	2.62	.68	5,220	11 or 12
Major - - - - -	42	5.53	2.42	15,100	50 or 51
Captain - - - - -	33	12.47	5.64	31,380	139 or 140
Lieutenant - - - - -	18	14.28	—	—	—
			9.62	57,000	

The proportionate annual increase of expenditure under the above scheme would be as 109 on 100.

V. The final query is as to the probable effect of an establishment where General Officers would be retired at 65 years of age, all other regulations being as in IV. The result of such an arrangement is computed to be as follows :—

STATEMENT showing the probable Effect of a proposed Establishment in which Generals would Retire at 65 Years of Age, Colonels be liable to Retirement at 60, Lieutenant Colonels at 54, Majors at 48, and Captains at 42.

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
General - - - - -	58	1.94	1.52	£. 11,660	16 or 17
Colonel - - - - -	54	2.16	—	—	—
Lieutenant Colonel - - - - -	48	2.66	.2	1,535	3 or 4
Major - - - - -	42	5.53	2.38	14,860	49 or 50
Captain - - - - -	33	12.47	5.64	31,380	139 or 140
Lieutenant - - - - -	18	14.28	—	—	—
			9.74	59,435	

The proportionate annual increase of charge under the above-mentioned system is calculated to be as 113½ on 100.

In the consideration of the various schemes which have been investigated in the course of the present Memorandum, it should be remembered that the age for the entry of Lieutenants has been assumed to be 18 years. Should this age not be adhered to, and younger officers be appointed, a smaller number of annual nominations will suffice to keep up the strength of the corps; and there will be a corresponding reduction in the number of compulsory retirements, and cost of pensions. On the other hand, should officers be appointed above the age of 18 years, a larger number of annual appointments will be requisite; and there will be a consequent increase of retirements and expenditure.

National Debt Office,
24 July 1877.

Alex. J. Finlaison,
Actuary.

MEMORANDUM as to the Effect on the Cost of Pensions of an Increase in the Number of Lieutenant Colonels on the Artillery Establishment from Three to Four.

It is found that the increase from three to four in the number of Lieutenant Colonels in the Artillery will cause but an inconsiderable augmentation in the annual charge for pensions, probably under 100 £ a year, for the increased cost of Generals' and Lieutenant Colonels' pensions is almost balanced by the diminution in the cost of the compulsory retirement of Majors, through the higher rate of promotion from that rank, consequent upon the addition made to the number of Lieutenant Colonels; with the above increment the cost of scheme Number V. may therefore be placed at 59,500 £.

National Debt Office,
1 August 1877.

Alex. J. Finlaison,
Actuary.

MEMORANDUM as to the Effect of a further Increase in the Number of Officers on the Establishment.

The further augmentation of the establishment upon which the calculation No. V. of the 24th ultimo was based, by the addition of a Colonel as Deputy Adjutant General, a Lieutenant Colonel as Assistant Adjutant General, two other Lieutenant Colonels (one of whom was alluded to in the Memorandum of the 1st instant), and four Lieutenants as Assistant Gunnery and Musketry Instructors (i.e., one to the Artillery and three to the Infantry), would have the following effect upon the pension list, namely:—

GRADE.	Age at which Grade is Attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
				£.	
General - - - - -	58	2.03	1.61	12,345	17 or 18
Colonel - - - - -	54	2.29	—	—	—
Lieutenant Colonel - - - - -	48	3.14	.5	3,840	8 or 9
Major - - - - -	42	5.53	1.9	11,870	39 or 40
Captain - - - - -	33	12.62	5.79	32,220	143 or 144
Lieutenant - - - - -	18	14.46	—	—	—
			9.8	60,275	

The addition of the Deputy Adjutant and of the Assistant Adjutant General to the Establishment, as stated in my computation, No. 5, would result in the following state of affairs:—

GRADE.	Number of Officers.	Age at which Grade is attained.	Annual Number of Promotions to Grade.	Annual Number of Compulsory Retirements.	Ultimate Annual Charge for Pensions.	Approximate Number of Pensioners.
					£.	
General - - -	12	58	2.03	1.61	12,345	17 or 18
Colonel - - -	10	54	2.29	—	—	—
Lieutenant Colonel - - -	17	48	2.97	.34	2,610	5 or 6
Major - - -	32	42	5.53	2.07	12,930	43 or 44
Captain - - -	109	33	12.47	5.64	31,380	139 or 140
Lieutenant - - -	200	18	14.28	—	—	—
	380			9.66	59,265	

National Debt Office, }
5 August 1877. }

Alex. J. Finlaison,
Actuary.

NAVY (ROYAL MARINES)

**COPY of REPORT of a DEPARTMENTAL
COMMITTEE appointed to Report upon Pensions
and RETIREMENT in the CORPS of the
MARINES.**

(Mr. William Henry Smith.)

*Ordered, by The House of Commons, to be Printed
14 August 1877.*

[Price 6 d.]

422.

Under 6 d.

NAVAL CADETS COLLEGE SITE.

R E P O R T

OF THE

C O M M I T T E E

APPOINTED BY THE

LORDS COMMISSIONERS OF THE ADMIRALTY

TO ADVISE AS TO THE MOST DESIRABLE

SITE FOR A COLLEGE FOR NAVAL CADETS.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1877.

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NAVAL CADETS COLLEGE SITE.

Instructions to the Committee.

SIR,

Admiralty, 20th July 1876.

I AM commanded by my Lords Commissioners of the Admiralty to acquaint you that they have been pleased to appoint you Chairman of a Committee, consisting of yourself, the officers named in the margin,* and Dr. John Sutherland, to advise their Lordships as to the most desirable site for a College for Naval Cadets. The Committee are to have regard to the following points, namely :—

1. General salubrity.
2. Supply of water.
3. A close harbour, giving facilities for the accommodation of a small training vessel, and for boating and bathing with safety.
4. Easy access to the sea from such harbour.
5. Proper space for recreation ground on shore, and suitability of the neighbourhood for walking exercise.
6. Absence of special temptations to immorality in the neighbourhood.
7. General suitability, including means of access by railway.
8. Cæteris paribus, reasonable proximity to a great naval port is to be taken into consideration.

The Committee will meet at No. 1 New Street, Spring Gardens, about the 7th of August.

Admiral Wellesley, C.B.

I am, &c.
(Signed) ROBERT HALL.

Letter forwarding the Report of the Committee.

Committee Room, No. 1 New Street, S.W.,
30th November 1876.

SIR,

I HAVE the honour to forward herewith the Report of the Committee appointed to advise their Lordships as to the most desirable site for a College for Naval Cadets.

I desire to bring to their Lordships' notice the very valuable assistance rendered by Dr. Sutherland, of the War Office, in the prosecution of the inquiries entrusted to the Committee.

I have, &c.

GEORGE G. WELLESLEY, Admiral,
Chairman of the Committee.

The Secretary of the Admiralty,
Whitehall.

* Captain C. T. Curme, R.N.
Captain W. E. Gordon, R.N.
Dr. James Donnet, Inspector-General of Hospitals and Fleet, Retired.
Mr. George Grandidier, Paymaster R.N., Secretary.

REPORT OF THE COMMITTEE.

Committee Room, No. 1, New Street, Spring Gardens,
30th November 1876.

THE Committee appointed by the Lords Commissioners of the Admiralty on the 20th July last "to advise their Lordships as to the most desirable site for a College for Naval Cadets," having completed their inquiries, beg to submit the following report :—

As directed, they have had regard to the following points, viz. :

"General salubrity."

"Supply of water."

"A close harbour, giving facilities for the accommodation of a small training vessel and for boating and bathing with safety."

"Easy access to the sea from such harbour."

"Proper space for recreation ground, and suitability of the neighbourhood for walking exercise."

"Absence of special temptations to immorality in the neighbourhood."

"General suitability, including means of access by railway."

"Cæteris paribus, reasonable proximity to a great naval port is to be taken into consideration."

2. Public attention was called to the object of the Committee by the insertion in the newspapers of an advertisement, inviting offers of eligible sites, accessible by sea or tidal waters. In reply to which, a considerable number of sites have been brought to their notice, all of which have been visited and carefully examined.

3. Although the majority of the sites have, though in different degrees, sufficient sanitary advantages and facilities for drainage and water supply, the instructions of the Committee require that any sites selected by them for final approval should possess other advantages besides those of mere local position.

They will proceed to make some observations, first, in respect to their general suitability, and next, to medical and sanitary considerations, on a revision of which they base their recommendations.

4. Whatever importance may be attached to the College being situated in close proximity to a Naval Dockyard, the Committee are strongly of opinion that the selection of any one of the sites available in the immediate vicinity of Portsmouth or Devonport yards would either subject the cadets to immoral temptations, or involve the necessity of an entire alteration in the admirable system, now in force in the "Britannia," of allowing them free range for exercise in the surrounding country. The same remark applies also, though in a less degree, to the sites offered in Milford Haven. For this, as well as other reasons which make these sites unsuitable, the Committee cannot recommend any of them. Were, however, close proximity to a Naval Dockyard held essential, then, on sanitary, as well as other grounds, they are of opinion that site No. 2 (Bury Hall) would be the least objectionable.

Sites,
Nos. 1, 2, 6,
23, 24, and
25.

Sites,
Nos. 27 and
28.

5. Hayling Island possesses no special recommendation except its comparative seclusion. It is not near enough to Portsmouth Dockyard to benefit by any supposed advantages of proximity, and the small tidal harbours, though frequented by coasting vessels, are neither suitable for a training vessel nor for boating and bathing. The same may be said of Hill Head in regard to its proximity to Portsmouth Dockyard, and the absence of special recommendations, and there is no close harbour and little or no facility for boating and bathing.

Sites,
Nos. 4 and 5.

Sites, No. 3,
(a. & b.)

Westward Ho—The climate of this neighbourhood is in good repute, but in other respects this site is inconvenient as to position and other requirements.

Site No. 26.

Isle of Wight, Southampton Water, and Dartmouth.—Other sites in the same localities possessing superior advantages, those marginally noted, do not need any special remark.

Sites,
Nos. 7, 9, 10,
20, 21, 22.

6. Poole.—The choice of three sites in this locality has been generously offered for the erection of a Naval College, by Sir Ivor Guest, as a free gift to the nation. The Committee regret that they are unable to recommend the acceptance of any one of them, as in their opinion there are very grave objections to them all. On the points of proper space for recreation facilities, for boating and bathing, accommodation for a training vessel, and ready access to the sea, they are each and all unsuitable.

Sites,
Nos. 11, 12,
and 13.

7. Weymouth.—Several sites are obtainable in this locality, the most favourable one being No. 14 (Bincleaves) which has however two great disadvantages, in being too close to Weymouth and also much exposed.

Portland Roads would have to be the station for the training vessel, and notwithstanding the security of the anchorage, boating would be often attended with risk, and in fact could only occasionally be resorted to as a recreation. No doubt the presence of our ships of war in the roads from time to time would tend to excite in the cadets an interest in their future career, but beyond this there does not seem sufficient ground for recommending the selection of any of the sites at Weymouth.

8. There only remain for consideration a site at Wootton (No. 7a), a site at Southampton Water (No. 8), and Mount Boon at Dartmouth (No. 19), the respective advantages and disadvantages of which may be thus stated. It is an undoubted fact that the rainfall at Dartmouth is much greater and more frequent than on the banks of the Solent, and thus recreation and outdoor exercise are somewhat interfered with; but this inconvenience would be much less felt in a college on shore.

The Solent affords very superior advantages for the cruising of a training vessel, the benefit of which would be much more apparent in the event of the scheme of instruction embracing a more extended course of practical seamanship.

The Committee therefore conclude that if a site in important respects equally eligible with that of Dartmouth could be found on the banks of the Solent, that it would be preferable to select the latter.

As to Wootton (Isle of Wight), if the water were retained in the creek by a dam with gates, which it is believed could be done at no great expense, it would be easy to select from the property offered (upwards of 400 acres) a site fulfilling all the requisite conditions.

The inland water, formed as suggested, would be peculiarly well adapted for boating.

With respect to the site on Southampton Water (No. 8), which lies between the village of Hamble and Netley Hospital, its situation is a very good and commanding one, being in full view of all vessels passing through the Solent, an advantage perhaps not to be altogether overlooked in the placing of the Naval College. It is also well placed in an open country, free from special temptations; but the extent of the mud on the banks would necessitate the boating and bathing being carried on at a rather inconvenient distance from the college. If, therefore, the advantages of the Solent as a cruising ground and the superior dryness of the climate be considered as of primary importance, the Committee are of opinion that either of these sites might be advantageously selected, their advantages and disadvantages being pretty equally balanced.

With regard to Mount Boon, it appears to the Committee to be an admirable site in all respects, possessing every requisite; the only drawback being the large amount of rainfall and a certain amount of inconvenience to the movements of a training vessel without the use of steam.

The remarks on medical and sanitary points which follow are limited to the three sites which are specially reported in this paragraph, the rest having been rejected on other grounds.

Wootton (Isle of Wight).—The sites offered to the Committee are on the west side of Wootton Creek, Isle of Wight, and lie in a triangle, bounded on one side by the creek and on another by the Solent. The highest part of the ground is from 100 to 120 feet above water level, from which it slopes to the Solent on one side and to Wootton Creek on the other. The highest and flattest part of the land consists of sand and gravel resting on clay, at a depth of 8 to 10 feet. The sloping ground towards Wootton Creek has been examined by the Commanding Royal Engineer, who reports that the first few inches consist of mould, below which clay was reached, and extended to the depth of the bore (6 feet). The clay, except at one point, appears not to be very dense, but in one field blue clay was found 5 feet below surface.

The local climate is probably the same as that of Parkhurst, which has an annual average of rainfall of 32·08 inches, and about 127 rainy days in a year.

There are ample facilities for bathing at half tide; but should Wootton Creek be dammed up, there would be facilities at all times.

There are two small springs of water on the property, proceeding from the gravel lap referred to, but not in any quantity. For an adjacent residence water is obtained from a well 80 feet deep, which is said always to contain 20 feet of water.

Samples from each of these sources, submitted to analysis, were found to be too impure for use, and water would have to be obtained from Ryde Waterworks.

There are ample means of drainage into the Solent, and also towards Wootton Creek.

As there is no population of any consequence on or near the site, there are no means

of ascertaining the local death rates, but there is no reason to doubt that the locality is as healthy as any other on the same side of the island.

The sloping clay ground is not suitable for the College buildings on account of the nature of the subsoil, and its relation to the surface drainage of the gravel lap covering higher ground, from which at present water oozes out and descends the slope.

If any part of the Wootton property be selected, it should be on the highest level, where the subsoil is gravel and sand, and where possibly a sufficient level of area could be selected for both buildings and play-grounds.

The site is completely isolated from population, and as it is all inclosed there is not much extent for walking exercise without going further inland; there are no local causes of unhealthiness on or near the ground; but as already stated, the only portion of it suitable for a Naval College is the highest level, but there is some disadvantage arising from the fact that this area is not sheltered from northerly and N.E. winds; this disadvantage might be partially overcome by facing the building to the S.E., by walling and tree planting. With these precautions in building, this site ought to be a healthy one for the proposed purpose.

Site on Southampton Water, belonging to Winchester College.—Is 80 acres in extent, bounded by Lord Hardwicke's property on the N.W., and by the church and village of Hamble on the S.E., on the N.E. the boundary is the high road from Hamble ferry to Southampton, and on the S.W. the foreshore of Southampton Water.

The upper part of the site is nearly flat, and is 54 feet above water mark; there is ample space for buildings on the high level, from which the ground slopes gently to the foreshore.

The College could be placed about 700 yards from the foreshore, no part of which, nor of the low water, mud, and gravel banks, can be seen from the ground level of the site.

The subsoil of the site is similar to that of the entire district, and consists of gravel, sand, and clayey soil, belonging to the Middle Bagshot beds, and disposed in varying series inclining from N.E. to S.W.

We requested the Commanding Royal Engineer to examine the subsoil to the depth of 6 feet, which afforded the following section, viz. :—

1 foot of earth,
1 do of clay,
4 do of gravel,

with every appearance of the gravel extending lower down. On adjacent land, gravel has been dug to the depth of 12 feet.

No water was met with during the excavation.

The local climate is largely influenced by the sea breeze coming from the Solent. The average annual rainfall during the last five years has been 29.29 in., and the number of days upon which rain fell 137.8.

The means of drainage are ample. Water would have to be obtained from a well, the best position for which would apparently be towards the N.W. angle, at the point furthest removed from the estuary.

As the stratification is the same as that under Netley Hospital, there is every reason to believe that water of a similar quality to that supplied to the hospital could be obtained. The well furthest from the estuary, at a level which corresponds with the level of the proposed site, is 330 feet deep, and yields about 28,000 gallons per day of water of good quality. There are facilities for bathing only at high water; but as the foreshore is covered with mud at a short distance out, it would require to be prepared for the purpose.

The site is completely isolated from population, except that of the small adjacent hamlet of Hamble; and there are ample means of walking exercise, not only along the foreshore but likewise along the estuary banks, besides which the roads, which are quite in the country, afford access to some of the healthiest neighbourhoods of England. We have obtained sufficient information from the registrar of the district, and also from medical men who practise in it, to enable us to state that Hamble district, if not the healthiest, is at least one of the healthiest in England apparently, and, so far as the returns enable us to judge, there is no district in the country so healthy.

The registrar states that during the last eight years the death rate has been less than 15 per 1,000 for the parish of the Hamble. Out of the 49 deaths during the period, 24 were over 60 years of age, and 19 of these died over 72 years of age. During the

A 4

same period only 5 infants died under one year of age. There has not been one death from fever during the period, and only one case which was imported and recovered.

Between the ages of 14 and 33 years there were only three deaths, two from phthisis and one from small-pox.

Considering this site in reference to its topography, subsoil, climate, means of drainage and water supply, facilities for exercise, and its general salubrity, there can be no doubt that it is well adapted for a Naval Cadets College.

Mount Boon, site Dartmouth.—This estate forms part of a projecting mass of old red sandstone rock and shales belonging to the Devonian series, on the west side of the Dart, into which it juts for a short distance. The sides of the projection are steep and covered with grass and wood down to the water's edge; and a little to the east, in the channel of the Dart, the "Britannia" and "Hindoostan" are moored. About 200 feet above the water the ground slopes gently upwards to the westward, and ends in a nearly level plain about 265 feet above the water level, partly inclosed by woods. Further westward it rises to the height of 284 feet. On all sides the proposed site is sheltered by higher hills, and on the south-east it overlooks the town of Dartmouth and the opening of the Dart into the English Channel. The site is one of great natural beauty. The Commanding Royal Engineer of the district was so good as to make an examination of the site by boring in four separate places to a depth of 3 feet 6 inches, and found it to consist of small stones overlying slate. The climate is a moist one. From information before the Committee it appears that the average rainfall is 41·58 inches, which is greater than that of any other south-west site visited. Rain fell on 197 days in 1875. The means of drainage on all sides are ample. The best outlet for sewage would be into the Dart. Water from four sources in the neighbourhood of the site was submitted to analysis by the Commanding Royal Engineer, with the result that with one exception, a stream rising near Norton Damey, which had a slight vegetable contamination, all are remarkably pure and soft, so much so that care should be taken in collecting and distributing any of these waters, to use iron pipes and tanks. The Report of the Commanding Royal Engineer shows that sufficient water can be obtained. The site is completely removed from the population. There are ample means of exercise in the adjacent country. The facilities for bathing are not all that could be desired, but if a college were erected they might be extended and improved. The buildings could be so placed as to be sheltered from the north-east winds, and to face the mouth of the estuary, so as to receive the south-east winds. As there is no population close to the site, there are no means of ascertaining death rates, except for Dartmouth and Kingswear, where the circumstances of the population are so different from that of any that might be placed upon the proposed site that no comparison could be instituted between them. The cadets have been remarkably healthy. At the time of our visit there was not a single case in hospital, and only one of the lads on the sick list, arising from boils. Except in the moisture of the climate, the Mount Boon site must be pronounced the finest we have seen for a Cadet College, and may also be considered to be a perfectly healthy one, though not so invigorating for young lads destined to a sea life as might be desired.

9. On a review of the whole subject the Committee, subject to the remarks they have made as to the advantages of a position on the Solent, advise the selection of Mount Boon, at Dartmouth, as the site for the proposed College.

10. A tabular form is enclosed which gives in detail the Report of the Committee in respect to the suitability or otherwise of the different sites.

GEORGE G. WELLESLEY, Admiral, Chairman.

C. T. CURME, Capt. R.N.

WILLIAM E. GORDON, Capt. R.N.

JAMES DONNET, M.D., Inspector-General of Hospitals and Fleets.

JOHN SUTHERLAND, M.D., War Office.

GEORGE GRANDIDIER,

Paymaster R.N.,

Secretary to the Committee.

NAVAL CADETS COLLEGE.

TABULAR REPORT on the Sites visited by the COMMITTEE appointed to advise as to a SITE.

Name of the Site.	General Salubrity.	Supply of Water.	(a) A close Harbour. (b) Boating. (c) Bathing.	Access to the Sea.	(a) Recreation Ground. (b) Walking Exercises.	Absence of Special Temptations.	(a) General Suitability. (b) Access by Rail.	"Ceteris paribus," Proximity to a Naval Port.
GOSPORT. No. 1.—Monckton House.	Exposed to sea breeze. Good, but site rather low.	From Bury Cross Waterworks.	(a) Portsmouth Harbour affords fair facilities. (b) Indifferent. (c) Good.	Easy	(a) Sufficient and suitable. (b) Unsuitable.	Objectionable in this respect.	(a) Unsuitable. (b) Access easy.	Easy access to Portsmouth Dockyard.
No. 2.—Bury Hall.	Satisfactory	From Bury Cross Waterworks.	(a) Portsmouth Harbour and Stokes Bay afford fair facilities. (b) Indifferent. (c) Good.	Easy	(a) Sufficient and suitable. (b) Unsuitable.	Objectionable in this respect.	(a) Unsuitable. (b) Access easy.	Easy access to Portsmouth Dockyard.
No. 3 (a and b).—Hill Head (2 sites).	Satisfactory	From subsoil wells. Requires examination.	(a) No close harbour. (b) Bad. (c) Good.	-	(a) Unsuitable. (b) Good.	Unobjectionable	(a) Unsuitable. (b) Inconvenient.	Portsmouth Dockyard near, but not easily accessible.
HAYLING ISLAND. No. 4.—West End.	Doubtful unless sea breeze be blowing.	Water to be examined, probably brackish.	(a) Langstone Harbour not adapted. (b) Bad. (c) Indifferent.	Dangerous	(a) Unsuitable. (b) Unfavourable.	Unobjectionable	(a) Unsuitable. (b) Railway station near.	Portsmouth Dockyard accessible.
No. 5.—East End.	Doubtful if wind blew over Chichester Harbour.	Water to be examined, probably brackish.	(a) Chichester harbour not adapted. (b) Bad. (c) Indifferent.	Do.	(a) Do. (b) Do.	Unobjectionable	(a) Unsuitable. (b) Railway station near.	Portsmouth Dockyard accessible.
PORTSMOUTH. No. 6 (a).—Land near Lumps Fort (Property of War Department). No. 6 (b).—Land near Eastney Barracks. (Property of Admiralty.)	Too near outlet of Portsmouth drains. Ditto	From Portsmouth Waterworks. Ditto	} Insufficient in extent, and otherwise quite unsuitable. Unsuitable in all respects.	- -	(a) Unsuitable. (b) Unfavourable.	Objectionable in this respect.	(a) Unsuitable. (b) Moderately accessible.	Portsmouth Dockyard accessible.
ISLE OF WIGHT. No. 7.—Ryde. Mr. Dashwood's property.	Very good	From Ryde Waterworks.						
No. 7 (a).—Wootton	Satisfactory, but subsoil consists of more or less dense clay and brick earth. Highest site on gravel the best for exercises, but it is exposed to all winds without shelter. The best also for the building.	Quantity and quality have been inquired into. Must be obtained from Ryde Waterworks.	(a) No close harbour. (b) Bad. (c) Bad. (a) Anchorage on Motherbank, and close harbour to be made in the creek. (b) Very good. (c) Very good.	Easy	(a) Sufficient. (b) Favourable.	Unobjectionable in this respect.	(a) Suitable. (b) Accessible by steamer from Portsmouth.	Portsmouth Dockyard easily accessible.

TABULAR REPORT on the SITES visited by the COMMITTEE—continued.

Name of the Site.	General Salubrity.	Supply of Water.	(a) A close Harbour. (b) Boating. (c) Swimming.	Access to the Sea.	(a) Recreation Ground. (b) Walking Exercise.	Absence of Special Temptations.	(a) General Suitability. (b) Access by Rail.	"Ceteris paribus," Proximity to a Naval Port.
SOUTHAMPTON WATER and HAMBLE RIVER. No. 8.—Winchester College property. (West of Hamble).	Very good -	Must be obtained from wells.	(a) Hamble River and Southampton Water. (b) Fairly good. (c) Fairly good.	Easy -	(a) Satisfactory. (b) Suitable.	Unobjectionable in this respect.	(a) Fairly suited. (b) Easily accessible.	Portsmouth Dockyard easily accessible by water.
No. 9.—Satchel Farm (Hamble River).	Good, but near salt water marsh.	Must be obtained from wells. To be examined.	} Not equal to the other site on this farm.					
No. 10.—Satchel Farm (Hamble River).	Very good -	Must be obtained from wells. To be examined.	(a) Hamble River and Southampton Water. (b) Good. (c) Good.	Easy.	(a) Satisfactory. (b) Suitable.	Unobjectionable in this respect.	(a) Fairly suitable. (b) Easily accessible.	Portsmouth Dockyard easily accessible by water.
POOLE. No. 11.—Hamworthy Heath.	Climate relaxing, site not satisfactory from mud and water surface.	Must be obtained from wells. To be examined. Unless obtained from distant waterworks.	(a) Poole Harbour anchorage inconveniently distant. (b) Bad. (c) Indifferent.	Not easy -	(a) Unsuitable. (b) Suitable.	Unobjectionable in this respect.	(a) Unsuitable. (b) Railway accessible.	Remote.
No. 12.—Longfleet -	Tolerably good -	From waterworks -	(a) Poole Harbour inconvenient for training vessel. (b) Bad. (c) Indifferent.	Not easy -	(a) Unsuitable. (b) Unfavourable.	Objectionable in this respect.	(a) Unsuitable. (b) Accessible.	Remote.
No. 13.—Parkstone	Not good, exposed to emanations from mud banks.	From distant waterworks.	(a) Poole Harbour inconvenient for training vessel. (b) Bad. (c) Indifferent.	Not easy -	(a) Unsuitable. (b) Unfavourable.	Objectionable in this respect.	(a) Unsuitable. (b) Accessible.	Remote.
WYMOUTH. No. 14.—Binceleaves.	Very good. Site exposed to S.W. wind.	From waterworks -	(a) Weymouth Harbour inadequate. (b) Moderately good. (c) Good.	Portland Roads and sea accessible.	(a) Satisfactory. (b) Not wholly satisfactory.	Objectionable in this respect.	(a) Suitable in many respects. (b) Accessible.	Remote.
No. 15.—Buxton's Lane.	Very good. Sheltered from wind.	From waterworks -	(a) Weymouth Harbour inadequate. (b) Moderately good. (c) Good.	Portland Roads and sea accessible.	(a) Fairly suitable. (b) Not wholly satisfactory.	Objectionable in this respect.	(a) Suitable in many respects. (b) Accessible.	Remote.
No. 16.—Bellefield -	Site on a slope. Healthy. Exposed to S.W. wind.	From waterworks -	(a) Weymouth Harbour inadequate. (b) Facilities indifferent. (c) Facilities indifferent.	Portland Roads and sea accessible.	(a) Fairly suitable. (b) Not wholly satisfactory.	Objectionable in this respect.	(a) Unsuitable. (b) Accessible.	Remote.
No. 17.—Bellefield (2nd site) and Wyke Nap.	Not so good as Binceleaves	From waterworks -	The area of these sites too limited.					
No. 18.—Park Mead	Not so good as other Weymouth sites.	From wells -	(a) No close harbour. (b) Fairly good. (c) Good.	Portland Roads and sea accessible.	(a) Suitable (b) Favourable.	Unobjectionable -	(a) Fairly suitable. (b) Accessible.	Remote.

TABULAR REPORT ON THE SITES VISITED BY THE COMMITTEE—continued.

Name of the Site.	General Salubrity.	Supply of Water.	(a) A close Harbour. (b) Boating. (c) Bathing.	Access to the sea.	(a) Recreation Ground. (b) Walking Exercises.	Absence of Special Temptations.	(a) General Suitability. (b) Access by Rail.	"Cæteris paribus," Proximity to a Naval Port.
DARTMOUTH. No. 19. — Mount Boon.	Very good, but climate moist.	From existing sources. Quality very good.	(a) River Dart, very good. (b) Very good. (c) Very good.	Easy	(a) Suitable (b) Favourable.	Free	(a) Well suited. (b) Accessible.	Remote.
KINGSWEAR. No. 20.—Hoodown -	Satisfactory. 314 feet above water and much exposed.	Unknown; possibly from wells.	(a) River Dart, very good. (b) Facilities indifferent. (c) Facilities indifferent.	Easy	(a) Unsuitable (b) Favourable.	Free	(a) Unsuitable. (b) Accessible.	Remote.
No. 21.—Mouthdown	Satisfactory. 400 feet above water, and much exposed.	Unknown; possibly from wells.	(a) River Dart, but wanting in means of access. (b) Impracticable. (c) Impracticable.	Easy	(a) Unsuitable (b) Favourable.	Free	(a) Unsuitable. (b) Accessible.	Remote.
No. 22.—Green Park	Satisfactory	Unknown; possibly from wells.	(a) River Dart, but wanting in means of access. (b) Impracticable. (c) Impracticable.	Easy	(a) Suitable (b) Favourable.	Free	(a) Unsuitable. (b) Accessible.	Remote.
DEVONPORT. No. 23. — Treval Farm.	Not satisfactory from local moisture and mud banks.	From wells	(a) Hamoaze. (b) Unfit. (c) Unfit.	Easy	(a) Suitable (b) Unfavourable.	Objectionable in this respect.	(a) Not suitable. (b) Easily accessible.	Devonport Dockyard easily accessible.
No. 24. — Yoderberry Point.	Satisfactory, but climate moist.	From wells	(a) Hamoaze. (b) Unfit. (c) Fair facilities.	Easy	(a) Suitable. (b) Unfavourable.	Objectionable in this respect.	(a) Not suitable. (b) Railway accessible.	Keyham Dockyard exactly opposite.
No. 25.—Thanckes	Satisfactory, but climate moist.	From wells	(a) Hamoaze. (b) Unfit. (c) Fair facilities.	Easy	(a) Not suitable (b) Unfavourable.	Objectionable in this respect.	(a) Not suitable. (b) Railway accessible.	Keyham Dockyard exactly opposite.
WESTWARD HO. No. 26. — General Hutchinson's land.	Not so good as on higher ground; situated on a low shore.	From wells	(a) Estuary of Taw and Torridge not suitable. (b) Inconvenient. (c) Unfit.	Difficult	(a) Sufficient, but unsuitable. (b) Favourable at present.	Unobjectionable in this respect.	(a) Not suitable. (b) Moderately accessible.	Remote.
MILFORD HAVEN. No. 27. — Newton Noyes.	Very good, but climate moist.	From existing springs or wells.	(a) Milford Haven. (b) Fair facilities. (c) Good.	Easy	(a) Suitable (b) Favourable.	Unobjectionable in this respect.	(a) Suitable. (b) Railway accessible.	Pembroke Dockyard easily accessible.
No. 28.—Castle Hall	Part good, but exposed to muddy estuary.	From existing springs or wells.	(a) Milford Haven. (b) Difficult of access. (c) Difficult of access.	Easy	(a) Inconvenient. (b) Unfavourable.	Objectionable in this respect.	(a) Not suitable. (b) Railway accessible.	Pembroke Dockyard easily accessible.

(Signed) GEORGE G. WELLESLEY, Admiral,
Chairman of the Committee.

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First Annual Report on Royal Naval College.

ROYAL NAVAL COLLEGE, GREENWICH,
October, 1876.

The Secretary of the Admiralty.

SIR,

In accordance with the desire of the Admiralty, verbally made known to me, I have the honour to make the following report on the Royal Naval College for the year terminating 30th September, 1876.

General Scheme.

The general scheme of the College comprises one "session," extending from October 1st to June 30th, during which a defined course of study for each class of Students is pursued and completed. Having passed through this course, the Students leave the College, with the following exceptions, viz :—1. All the Students of Naval Architecture, and two of the second class Assistant Engineers (selected annually), whose course of study is prolonged for three sessions. 2. The probationary Lieutenants of *Royal Marine Artillery*, who have in the last session been selected from the most advanced of the probationary Officers of Royal Marines, and whose course extends over two sessions (the regulations concerning these Officers are now altered). 3. Such of the voluntary Students as desire to remain for a second session, whose examination at the end of their first session indicates satisfactory progress.

During this nine months' session there are vacations for ten days at Christmas, and a week at Easter, thus dividing the session into three terms.

This sessional arrangement does not include the Acting Sub-Lieutenants, and Acting Navigating Sub-Lieutenants, who come to the College in detachments, monthly, after passing their examination in gunnery, and go up for their College examination after a full six months' study at the College; those who fail being allowed a second trial after a lapse of six or seven weeks. These Officers have a six weeks' vacation at Midsummer, commencing 30th June, and a month at Christmas. They are also allowed a week at Easter, and five days at Michaelmas.

The Candidates for Naval Instructorships go through the same course as the Acting Sub-Lieutenants, with the exception of Mathematics, in which they are examined on entry.

The ordinary operations of the College fall under two divisions :—first, the Educational, comprising the organization and efficiency of the instructing Staff, with the instruction and progress of the Students; and, secondly, the Disciplinary, comprising the general conduct of the Students, and the order maintained within the College.

Educational.

The whole of the Educational Department is conducted under the immediate supervision of the Director of Studies (Dr. T. A. Hirst, F.R.S.), who is assisted for examination duties by a Naval Instructor. (H. B. Goodwin, Esq., M.A.)

The organization of the Staff with reference to the various classes of Students has been as follows :—

Students of Naval Architecture (15 in number) and of Marine Engineering (32 in number), including Engineer Officers joining for voluntary study, Foreign and private Students.

These Students are placed in two classes, a higher and a lower class; the higher one being again sub-divided into two sections.

Both classes have pursued their studies in Mathematics and Applied Mechanics daily in the forenoon under the immediate direction respectively of Professor Miller and

[C.—1672.] Price 1d.

Professor Cotterill, the former assisted by Mark Pole, Esq., B.A., and the latter by Mr. T. A. Hearson, Engineer R.N., F.R.S.N.A. The classes have been taken alternately.

In the afternoons (except Saturday) they have pursued their respective professional subjects under the tuition of Messrs. W. H. White, F.R.S.N.A., and Alfred Morcom, Engineer R.N., F.R.S.N.A., Instructors in Naval Architecture and Marine Engineering; Mr. W. B. Baskcomb, Instructor in Shipbuilding, and Mr. John Maxton, Instructor in Marine Engine Drawing.

Besides the above studies, all these Students have attended the Lectures in Chemistry and Physics given twice a-week by the Professors in those subjects (Dr. Debus, F.R.S., and A. W. Reinold, Esq., M.A.); those Students who are in their second and third years receiving in addition instruction in Practical Chemistry, under the Demonstrator (Mr. Thomas Wills), and those in their third year also in Practical Physics, under the Demonstrator (Mr. A. Haddon).

In addition to the foregoing subjects, the Students of the second and third years have studied French under M. Penon.

The nature of their profession requires in these Students a higher knowledge of Mathematics than is necessary for any other class of Students at the College. Under the above arrangements they have had full opportunity of acquiring the requisite knowledge, and they have availed themselves of it with diligence, as shown by the results of the Examination accompanying the Director of Studies' Reports (three in number), forwarded to their Lordships on 25th and 31st July.

The Engineer Officers appointed for a voluntary course of study have included two Chief Engineers, seven Engineers, and one first class Assistant Engineer. They have been allowed a full choice of subjects, but have naturally selected professional ones, in addition to Practical Chemistry, and Physics and French.

Lieutenants qualifying for Gunnery Officers (18 in number), with whom have been associated, for Mathematical Studies, the Probationary Lieutenants R.M.A., and such Half-Pay Executive Officers R.N. and Marine Officers as were equal to this course, as hereinafter stated.

The Mathematical Studies of these Officers have been personally directed with great ability by Assistant Professor C. J. Lambert, assisted, first, by J. Henry, Esq., B.A. (since appointed Head Master of the Chatham Dockyard School), and afterwards by William Glead, Esq., B.A. The Report of the Director of Studies on the result of their examination, forwarded on 14th July, shows the diligence and success with which these Officers have applied themselves to the study of these subjects.

In addition to the course of Mathematics, these Officers have, during the entire session, attended the regular Lectures (twice a-week) on Physics, and during the last term have received instruction in Practical Physics. During the first term of the session they attended also the regular Lectures on Chemistry.

They have further received instruction twice a-week in Fortification and Military Surveying (including out-door work during the last term of the session), under the Professor of Fortification, Captain C. C. Suther, R.M.A.

The above remarks apply to the various subjects comprised in the compulsory course for Gunnery Officers, but it should be added that these Officers are not precluded from taking up voluntary subjects, so far as they may have opportunity, to enable them to enter with a greater chance of success into the competition for the College Prizes, the first and third of which were carried off by these Officers.

Probationary Lieutenants, Royal Marine Artillery (undergoing second year's course).

These Officers, four in number, have been attached for Mathematics to the class of Officers qualifying for Gunnery Lieutenants, under Assistant Professor Lambert. They have attended the regular Lectures on Physics, and have received instruction in Fortification two afternoons each week, under the Professor of Fortification, and in Military History, one morning a-week, under the Assistant Professor of Fortification (Captain J. L. Needham, R.M.A.).

Two afternoons a-week have been devoted to the study of French, German, and Drawing, a certain option being allowed to them in the choice of the two latter subjects.

Only one of these Officers had been originally nominated for the Royal Marine Artillery; the others having obtained first-class certificates in their previous year's course (as Probationary Lieutenants R.M.L.I.), were permitted to return for a second session to qualify for the Royal Marine Artillery. The attainments of these Officers were

not on their entry so high as has heretofore been required in the case of Probationary Lieutenants R.M.A., and they are not now so far advanced as Officers hitherto receiving a Commission in the Royal Marine Artillery on leaving the College. This point is fully explained in the Report of the Director of Studies on the result of their examination, forwarded on 17th July.

Probationary Lieutenants Royal Marines.

Seven of these young gentlemen, entered last year, have gone through a course of study during the past session. They have undergone a special course of Mathematics under the tuition of Mark Pole, Esq., B.A., Instructor in that subject. They have also had, with the Acting Sub-Lieutenants, a special course of instruction in Physics. For two half-days a-week they have been instructed in Fortification by Captain Suther, and for one half-day a-week in Military History by Captain Needham. They have further been instructed and exercised for one day in each week in Military Surveying. Their course has also included the study of French, with an option between German and Drawing, for two afternoons in the week.

It may be added, that during their residence at the College they have been subjected to a course of Drill Instruction.

Half-Pay (Executive) and Marine Officers appointed for a Voluntary course of Study.

The Report has so far embraced the various classes for which fixed and compulsory courses of study, arranged with reference to the duration of the session, have been established.

There remain the classes composed of Executive Officers of various ranks who are appointed to the College at their own desire, for a voluntary course of study. Many of these Students, especially the Lieutenants R.N., are necessarily appointed to the College and leave it at irregular times during the session, as the period of half-pay time which they are able to devote to the College is uncertain, and they are liable at any time to appointments afloat.

During the past session, 4 Captains, 4 Commanders, 93 Lieutenants R.N., and 8 Navigating Lieutenants, have studied at the College, but of these only 1 Captain, 33 Lieutenants, and 3 Navigating Lieutenants have gone through the whole nine months' course, although 1 Captain, 2 Commanders, 50 Lieutenants, and 3 Navigating Lieutenants underwent the final examination. Of these latter, 1 Captain, 22 Lieutenants, and 1 Navigating Lieutenant have gained Honorary Certificates, entitling them to the affix G to their names in the Navy List.

In addition to the above Naval Officers, the following Marine Officers, viz., 1 Captain and 1 Lieutenant R.M.A., and 1 Captain and 5 Lieutenants R.M.L.I., have voluntarily attended the College during the past session. Of these, 1 Lieutenant R.M.A. was prevented by illness from presenting himself for the final examination. All those examined succeeded in gaining Honorary Certificates; one Officer, Captain W. G. T. Bickford, R.M.A., obtaining also the second College prize.

Such of the voluntary Students as are sufficiently grounded are permitted to take the same course of Mathematical instruction as the Officers qualifying for Gunnery Lieutenants and the Probationary Lieutenants R.M.A., under Assistant Professor Lambert.

The instruction of the remainder of this class of Students in Mathematics has been conducted by J. K. Laughton, Esq., M.A., Mathematical and Naval Instructor and Lecturer in Meteorology, assisted during the first two terms by William Gleed, Esq., B.A., and during the last term by R. Solomon, Esq., B.A. The attainments in Mathematics of this class are not great, but it may be expected that the rudimentary knowledge now made necessary to pass for the rank of Lieutenant will be of great benefit to Half-pay Officers studying at the College in future years.

Optional Subjects of Study for Voluntary Students.

Besides the course of Mathematics, which alone is compulsory in the case of voluntary Students, systematic courses of instruction open to these Students have been given, extending over the entire session, in the following subjects, viz. :

In Physics—Lectures and Practical Work.

Chemistry " "

Steam.

Navigation and Nautical Astronomy.

Marine Surveying.
 Permanent and Field Fortification.
 Military Surveying and Drawing.
 Military History.
 Foreign Languages, viz., French, German, and Spanish.
 Freehand Drawing.

During the latter part of the session opportunity has also been given for practical instruction in Steam (under Mr. G. A. Tuck, Chief Engineer R.N.), and in Marine Surveying, under Staff-Commander V. F. Johnson, R.N., in H.M. Gun-boat "Arrow," attached to the College for the purpose.

The extent to which each subject has been taken up by the voluntary Students, and the amount of their attainments therein, will be readily gathered by a reference to the statement of the results of the examination.

Special Courses of Lectures.

Besides the regular instruction described above, special courses of Lectures on the subjects undermentioned have been given for the general benefit, and to which Officers in H.M. Service, not at the College, have been invited, viz. :

In Easter Term.

Military Tactics.—5 Lectures by Captain J. L. Needham, R.M.A.
 Meteorology.—8 Lectures by J. K. Laughton, Esq., M.A., R.N.
 Structural Arrangements of Ships of War.—5 Lectures by W. H. White, Esq., F.R.S.N.A.
 Magnetism.—3 Lectures by Staff Commander Mayes, R.N.
 Navigation and Nautical Astronomy.—30 Lectures by T. S. Oborn, Esq., R.N.

In Midsummer Term.

The Atmosphere as a vehicle for Signals at Sea.—1 Lecture by Professor Tyndall, F.R.S.
 International Law.—6 Lectures by Rt. Hon. M. Bernard, LL.D., &c.
 Naval History.—6 Lectures by J. K. Laughton, Esq., M.A., R.N.
 Marine Engineering.—4 Lectures by J. A. Bedbrook, Esq., R.N.
 Applied Mechanics and Strength of Materials; Combustion.—8 Lectures on each by T. A. Hearson, Esq., F.R.S.N.A.
 Practical Shipbuilding.—8 Lectures by W. B. Baskcomb, Esq.

Papers in all these subjects were included in, and marks awarded at, the final Examination in June.

Foreign Languages.

The following statement shows the number of those who have studied each of the Foreign Languages in which instruction has been given at the College, viz., French, German, and Spanish :—

	<i>French.</i>	<i>German.</i>	<i>Spanish.</i>
Engineers and Naval Architects.	21	..	..
Probationary Lieutenants R.M.A. } and R.M. }	8	5	..
Voluntary Students (Officers on } half-pay and Marine Officers) }	95	19	14

Private (including Foreign) Students.

The private Students have already been mentioned at p. 1. The prescribed period of study for them is, as for all Students who undergo the full course in Naval Architecture or Marine Engineering, three full sessions. During the past session there have been 1 English and 9 Foreign private Students. The English Student (Mr. A. Spyer) has completed the full course, and has gained a Professional Certificate of the third class. Five of the Foreign Students presented themselves at the final Examination, and the progress which they made may be gathered from the statements of the results of the Examination. It will be observed that Lieutenant Tuxen, of the Danish Navy, has made great progress.

Final Examination.

All the classes of Students enumerated in the foregoing remarks were subjected to the final Examination, by which their attainments have been tested. This Examination was conducted by eminent outside Examiners approved by their Lordships.

The Examination of two Engineer Officers who were detected in the use of helps in the Examination room, was, on my representing the circumstance to their Lordships, directed to be cancelled.

Reference has been already made to the reports of the Director of Studies, on the results of the Examination of the various classes, which have been duly forwarded to their Lordships.

Acting Sub-Lieutenants and Acting Navigating Sub-Lieutenants.

It remains only to speak of the Acting Sub-Lieutenants and Acting Navigating Lieutenants (Candidates for Naval Instructorships also following this course of study). The instruction of these Officers in Mathematics has been conducted by the three Instructors in Navigation and Nautical Astronomy, (T. S. Oborn, Esq., Rev. F. Davies, M.A., and William Silver, Esq.), specially attached to the College for this duty. They were instructed in Nautical Surveying and the use of Instruments by Staff-Commander V. F. Johnson, R.N., and in Steam by G. A. Tuck, Esq., Chief Engineer, to 30th June, and subsequently by Mr. John Yeo, Engineer R.N., with the assistance all through the session of Mr. W. J. Canter, Engineer R.N. A special course of Physics was arranged for them under Professor Reinold, and carried out with the aid of his Assistants; and they were instructed in French by M. Penon.

The subjects of study and Examination, the numbers of marks, and the conditions determining the classes of Certificates, are given in Admiralty Circular of 14th March, 1874.

The number of these Officers has varied very considerably from month to month, having reached a maximum of 102 in February, and a minimum of 47 in September last.

The total numbers examined have been :—

Of Acting Sub-Lieutenants.	103
" Navigating Sub-Lieutenants	15

Of these there were placed 14 in the first class, of whom 8 having obtained first classes previously in Seamanship and Gunnery, received each a prize of Books or Instruments to the value of £10, and were promoted; 32 in the second class, and 51 in the third class, of whom 7 had failed on their first trial.

Twenty-one having failed on their second trial, were removed from the Navy.

These failures do not appear to attach particularly to Officers who have not been under Naval Instructors whilst Midshipmen. They are, with rare exceptions, confined to those who are of limited capacity, and whose habits are not industrious. Being very backward on joining the College, and having passed the earlier months of their College course under a supposition that they might get through by making an effort towards the close, their failure has followed.

The results of the year show that the standard of examination is so adjusted as to enable Officers of good abilities who, on entering the Navy, diligently apply themselves to study their profession, to obtain their Lieutenant's Commission, whilst, on the other hand, it affords to those who are backward and ignorant on joining the College, an opportunity of retrieving lost time, and of maintaining their place in the Navy, if they earnestly avail themselves, throughout the whole period of study, of the means afforded them at the College.

Discipline.

The good order of the whole establishment is maintained under the immediate supervision of the Captain of the College, and I have great satisfaction in reporting that in all Classes and Departments this object has been attained in a high degree.

The Students at the College not being immediately subject to the restraints of Naval Discipline, it becomes my duty to report specially to the Admiralty any deviations from Officer-like conduct that may take place.

The only reports of this nature which I have had to make have referred to 9 Acting Sub-Lieutenants, and 1 Acting Navigating Sub-Lieutenant.

The example of Officers thus misconducting themselves is so pernicious to others who are preparing for examination, and who are exposed to their influence, that their temporary removal to a flagship, as ordered by their Lordships, has been very beneficial.

The conduct of the Probationary Lieutenants of Royal Marine Artillery and Royal Marines has been, without exception, blameless in every respect.

The Engineer Officers and Shipwright Students have also conducted themselves in a very exemplary manner; and their Mess has been managed with great regularity and economy.

The Senior Mess has been creditably managed without undue expense. The Half-Pay Officers residing in the College have taken an active part in its management by serving on the Committee, and their influence has been otherwise most beneficial.

Duties connected with other Educational Departments of the Navy.

Besides the ordinary operations within the College reported as above, a great amount of laborious work is done at the College connected with the other educational business of H.M. Navy, both in its Executive and Civil Branches. It may be summed up as follows, viz. :—

Entry Examinations, 1. For Naval Cadetships; 2. Assistant Clerkships R.N., which are held at the College. Two of each have been held in the year now under report.

Preliminary Examination of Candidates for Naval Instructorships (repeated on failure), conducted at the College. Five Candidates have been examined in the year.

Examination of Candidates for Interpreterships (Officers in H.M. Navy), also conducted at the College. Three Candidates have been examined.

Half-yearly Examination of Junior Executive Officers of all classes of the Fleet, conducted on board their respective Ships; Examination Papers being sent out from the College. The results of the alternate or Annual Examination (in July) are subjected to a careful analysis, the whole collated, and reported on exhaustively by the Director of Studies.

Half-yearly Examination of the Cadets in H.M.S. "Britannia," for each of the four terms; the papers for which are furnished, the Examination on board conducted, the results examined, and marks allotted by the Director of Studies, who makes an elaborate report on each occasion.

Half-yearly Examination of the Dockyard Schools. The papers are prepared at and sent from the College; the Examinations are held under the direction of the Director of Studies, in whose department the results are examined and marks allotted.

The Examinations are conducted under the immediate supervision of the Chaplains of the Dockyards.

Of these Examinations the alternate or yearly one in July is the more comprehensive and important, as determining which of the Engineer Students are qualified for Acting Appointments as Second Class Assistant Engineers, and as such, are to join the College for a course of study; and it forms the basis for the selection of the three Shipwright Apprentices to proceed to the College for the three years' course in Naval Architecture.

The Dockyard Schools at Chatham, Portsmouth, Devonport and Pembroke have, during the year, been inspected by the Director of Studies, and the result of his inspection duly reported.

The results of all these labours have been from time to time brought before the Admiralty during the past year in the carefully prepared reports of the Director of Studies, and I would take this opportunity of bearing testimony to the ability and indefatigable industry with which these and all the various duties entrusted to him, have been performed.

I am,

SIR,

Your obedient Servant,

E. G. FANSHAWE,

Admiral, President.

FIRST ANNUAL REPORT ON ROYAL
NAVAL COLLEGE.

*Presented to both Houses of Parliament by Command
of Her Majesty.*

LONDON :

Printed by HARRISON AND SONS, for H.M. Stationery Office.
(3627)

R E P O R T
OF THE
C O M M I T T E E
APPOINTED TO INQUIRE INTO THE ESTABLISHMENT OF
THE ROYAL NAVAL COLLEGE, GREENWICH,
WITH
MINUTES OF EVIDENCE, APPENDIX,
AND
INDEX TO EVIDENCE.

Presented to both Houses of Parliament by Command of Her Majesty.



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1877.

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Appointment of and Instructions for the Guidance of the Committee.

Admiralty,

29th September, 1876.

SIR,

It having been decided to hold an Inquiry into the Establishment of the Royal Naval College at Greenwich Hospital; embracing chiefly the following points:—

- 1st. Whether, having regard to the course of study laid down for the various classes of officers, the staff of Professors and Instructors is adequate and properly arranged with reference to the assistance required by the Students;
- 2nd. What the remuneration of such Professors and Instructors should be;
- 3rd. What course of lectures should be given in the year, if any, beyond those delivered by the regular Professors and Instructors, and what remuneration should be allowed for them;
- 4th. Whether in any, and, if so, in what cases, persons connected with the College or the Admiralty should be allowed to conduct the examinations;
- 5th. What should be the remuneration to the Examiners;

I am commanded by my Lords Commissioners of the Admiralty to ask whether you will have the goodness to serve as Chairman of the Committee about to enquire into these points.

The other members of the Committee will be, if willing to serve, the Rev. H. A. Morgan, of Jesus College, Cambridge, Mr. R. R. W. Lingen, C.B., Permanent Secretary of the Treasury, and Major Donnelly, R.E., of the South Kensington Museum.

Mr. C. D. Loveless, Superintendent of the Greenwich Hospital Branch of the Department of the Accountant General of the Navy, will act as Secretary; and it is proposed that the sittings shall commence in October.

I am,

Sir,

Your obedient servant,

(Signed) VERNON LUSHINGTON.

The Reverend Osborne Gordon, B.D.

REPORT.

TO THE SECRETARY OF THE ADMIRALTY.

SIR,

WE, the Committee appointed by the Lords Commissioners of the Admiralty, have the honour of presenting our report on the various questions submitted to us in connexion with the Royal Naval College at Greenwich.

1. In considering these questions it was not part of our duty to make any suggestions as to "the course of study laid down for the various classes of officers." We have therefore abstained from doing so, with the exception of the supplementary remarks in paragraphs 134-145, and we have simply endeavoured to ascertain what that course is in each case, with a view to forming an opinion "whether the staff of Professors and Instructors is adequate and properly arranged" in relation to it, having special regard to those branches of study which bear most directly upon the professional efficiency of naval officers.

CHAPTER I.—*Whether, having regard to the course of study laid down for the various classes of Officers, the staff of Professors and Instructors is adequate and properly arranged, with reference to the assistance required by the Students.*

2. We have found that the students in the college may be conveniently arranged in three classes, A., B., and C., and we have kept this arrangement in view in dealing with the questions which we have had to consider.

3. Class A. consists of those who are going through "fixed and compulsory courses" of study, arranged with reference to the duration of the session."

4. Class B. consists of executive and marine officers and officers of the navigating and engineer branches, who are admitted, on their own application, to the advantages of the college.

5. Class C. consists of acting sub-lieutenants and acting navigating sub-lieutenants, who are sent to the college to complete the course of education commenced on board the "Britannia," with a view to deciding whether they are to continue in the naval service or not.

6. Class A., however, has to be subdivided, comprising as it does—

(α) Students for one session of nine months, *i.e.*, from October to June.

These students are:—Lieutenants qualifying for gunnery officers, and all acting 2nd class assistant engineers, and Naval Instructors, who have received provisional appointments, subject to their passing a qualifying examination.

(β) Students for two sessions.

These students are:—Probationary lieutenants of the Royal Marine Artillery who are examined at the end of their first session. If they pass satisfactorily, they continue in residence for another session; if they fail they are discharged from the service.

(γ) Students for three sessions.

These students are:—Three dockyard apprentices, who, having passed five years at their dockyards, are selected annually by competitive examination for study at the college, and two acting second class assistant engineers selected annually from the Dockyards. With these are united the foreign and private students of naval architecture and marine engineering.

But all these sub-divisions have this in common, that they have "fixed and compulsory courses of study, arranged with reference to the duration of the session."

7. Class B., consisting of voluntary students, remains generally for one session only, except such members of it as may desire to remain for a second, a privilege conceded to those only "whose examination at the end of the first session indicates satisfactory progress," but up to the present time no one has availed himself of this privilege.

8. We directed our attention in the first instance to Classes A. and B., and we keep them together now, because what we have to say of them applies to both.

9. Our observations throughout this report will be better understood if it be borne in mind that the rooms in which instruction is given by the professors and instructors are called "studies," and that the practice is, for the professor or instructor to lecture

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Report on
Royal Naval
College.
"Command
Paper,"
No. 1672 of
1877.

Appendix,
No. 1, p. 78.

and demonstrate for about an hour, and then for the students who have heard his lecture to work by themselves, in the same room, individually, at examples, under such superintendence, and with such assistance as the professor, or the professor's assistant, or the instructor can give them afterwards.

10. We are satisfied, as regards both, that the staff of professors and instructors is adequate and properly arranged with reference to the assistance required by the students, except as stated in paragraph 18.

Ev. 141.
Ev. 202, 203,
205, 206,
211.

11. We have had the advantage of hearing the evidence of the President, of the Director of Studies, and of as many of the professors, instructors, and students as we thought necessary on this point, and we find them unanimous. We have had regard not only to the lectures, properly so called, but to the individual instruction. The President speaks without hesitation or reserve that it is sufficient. Dr. Hirst is equally decided.

Ev. 631.

12. The professors are perfectly satisfied, and assure us that they have every assistance they require for the successful discharge of their duties. We did not hear of any case among these classes where recourse was had to a private tutor. We did not meet with any student who was not perfectly satisfied with the assistance he received. We believe that there is even a reserve of teaching power in the college, should "the practical requirements of the navy hereafter call for a higher standard of mathematics than is at present attained," as Mr. Lambert anticipates. The only complaint he makes, in which some of the students also join, is that the time for the gunnery lieutenants is not quite long enough, and he is a man of that ability and zeal that we think his judgment on this point worthy of attention.

Ev. 247, 269,
280-296.

13. On the whole, from the various testimonies we have received, we are brought to the conclusion that there is very little deficient either in the quantity or quality of the higher instruction supplied to the classes A. and B. But while we have every reason to be satisfied with the provision made for the instruction of these classes, we are bound to say that Class B, particularly the half-pay lieutenants, are extremely remiss in availing themselves of the advantages offered. We take the table of absences in the month of May as an illustration. There were 104 hours of study in that month, the absences from which are on record, and it appears that one lieutenant was absent 83 hours, the average absences of the whole class being 30 hours. This contrasts very unfavourably with the gunnery lieutenants, one of whom was absent 15 hours, the average absences of the whole class being 3 hours 50 minutes. And we have it in evidence that the habits of the half-pay lieutenants, who are voluntary students, even when present, are far from regular. One lieutenant informed us that "he came in at 9, and then found that he was obliged to go out for a quarter of an hour about a quarter or half past ten, and then came in again for an hour, and so on," and this he called "being pretty regular." Under such circumstances, it is quite clear that a good deal of the time of the instructors and the money of the country must be spent to no purpose.

Ev. 1994,
1995.

14. We feel bound, however, to add, that the Returns for October show a more favourable result, and we hope that this improvement may be maintained throughout the summer months.

15. We recommend that each officer's attendance at lectures and studies should be officially recorded, and that returns showing the number of each officer's absences, or only partial attendances, should be furnished to the Admiralty, not less frequently than at the middle and at the end of each session—special attention being called in these returns to the more serious cases of irregularity.

16. We think it important, however, to add that, in our opinion, it is indispensable to place sufficient time at Dr. Hirst's disposal to enable him to make personal visits frequently and without notice to the classes at work, more especially those attended by the half-pay officers and the acting sub-lieutenants.

Appendix,
No. 5, p. 85.

17. It has been represented to us that Dr. Hirst is much overworked by the number of examinations which he has to superintend; but as we have hereafter to consider the question of examiners, we need not say any more on this point at present.

Ev. 76, 265,
280-296.

18. The need of a subaltern instructor under the Professor of Fortification and of a qualified assistant to take charge of the observatory, and to teach the use of fixed instruments, has been strongly pressed upon us. We would suggest whether one of the assistants of the neighbouring Royal Observatory might not be willing and able to undertake this latter duty for some moderate addition to his salary, without making a new appointment in the College, unless it should be found that the Instructor in Nautical Surveying requires further assistance.

19. It has been brought to our notice that there is a great need in the engineering course, of engines or models of engines, to make drawings from and to refer to, the only one at Greenwich being an old engine, of a type which is out of date. We believe it is only necessary to call attention to this want which has probably not been yet remedied in consequence of the recent establishment of the College. A few models or portions of engines of the newest type, which could readily be supplied from the Dockyards, would be of great service not only to the engineer students, but to all officers studying at the College.

Ev. 1778.

20. We now come to Class C., *i.e.*, the acting sub-lieutenants, who are at the College for their final examination after six months study. As regards these students we feel bound to say that the state of things is not satisfactory, either as to the means supplied for their instruction, or its results. During the last year it was found practically that the staff of instructors was not sufficient, but this was owing to the large number of students from exceptional causes, which are not likely to occur again. Admiral Fanshawe is, however, of opinion that it is amply sufficient for 50, and Dr. Hirst carries on this number to 75, the present number being 50.

Ev. 6, 8,
215, 219,
231.

21. We desire to refer to Dr. Hirst's answer to Question 241., as to the proportion which he thinks sufficient between the number of teachers and students. Ev. 241.

22. We think, however, that the evidence of sufficiency of instruction is not to be sought for solely from those who have arranged or supply it, but also from those who are subject to it.

23. Now it appears that the educational authorities of the College do not consider private tuition necessary, and dislike and discourage it; but we found that the system flourishes notwithstanding, and may be almost described as general. Of course, it may be expected that where the result of an examination is to decide whether a youth of 21 or 22 is to be excluded from a profession to which it may be presumed he has intended to devote his life, he will employ every help to ensure his passing. The idle and the backward will want help, and some will fancy that they want it though they do not. We should not regard the fact that a few men take private tutors as any proof that the instruction supplied is inadequate, but, when we find that at least 50 per cent. go to this expense, we cannot think it altogether needless. Neither is this practice confined to the idle or the backward. We found indeed one student, evidently a man of ability, who said he found every help in the College, and who had no doubt that he should pass out in the first class; but another who had passed out in the first class stated that he had had private tuition for three hours a day. A third who failed in his first examination, not (we were told) from want of industry, also had three hours private tuition for the last two months of his course, which cost him 10s. 6d. a day.

Ev. 1021-
1025.Ev. 1088,
1089, 1174,
2041.Ev. 1175-
1177.Ev. 1084,
1110.

24. The instructors have to do their work under very unfavourable circumstances. The acting sub-lieutenants enter the College in irregular numbers once a month. This fact makes any proper arrangement exceedingly difficult. Indeed, there is no attempt at it. Those sub-lieutenants who come up together are instructed together through the whole course, however unequal their abilities and acquirements when they enter, or their progress afterwards. The instructor almost "individualizes" them in his treatment, and, under the circumstances, he considers this the best plan, though, if they came up in larger numbers every three months, it would be better to classify them.

Ev. 2051.

25. Where a considerable number have to be thus "individualized," it is difficult to avoid confusion; and it is in evidence that in the Euclid and algebra study much noise is made by those who are doing nothing themselves, and interrupting others who are trying to work. We have even heard that men sometimes come into the study, especially after lunch, in a state that quite unfits them for real work.

Ev. 1193,
1425, 1426.
2064-2067.

26. This department (Class C.) cannot be considered without reference to the entire course of the education which executive officers of the navy have to pass through from the date of their election as naval cadets. We have before us the evidence of Admiral Sir A. Cooper Key, as regards the design and purpose of this College in relation to naval cadets.

"You are perhaps aware that we have lately established a course for sub-lieutenants at Greenwich. Instead of simply bringing them to the college to pass their examination, we have now a six-monthly course of instruction, and it has the very best effect. We instruct the sub-lieutenants in French, the use of instruments, taking observations and sights, as well as in algebra, trigonometry, geometry, and navigation, before they are examined, and a course of elementary physics, teaching them the construction and use of their own instruments, the telescope, the compass, azimuth compass, and theodolite, as well as also giving them an elementary knowledge of magnetism.

Report of
"Britannia"
Committee,
Command
Paper,
No. 1154 of
1875.

"Do you find that six months is sufficient for that?—It is as much as can be spared; but it must be remembered that all we teach, or nearly all we teach them, they ought to have known when they left the 'Britannia.' The utmost that we go up to when they pass as sub-lieutenants afterwards is very little beyond what they are supposed to know when they leave the 'Britannia.'

"Five years before?—Yes, the advantage of our system is that we take care they know it.

"Whatever they do learn, they learn thoroughly?—Yes, they learn well; it is a recapitulation of their former work.

"What do they appear to forget most in that interval of five years?—Algebra, trigonometry, and geometry."

The end proposed here is a modest one. They are to recapitulate at the age of 20 or 21 what they learned before they were 15. But the expression is an inaccurate account of what they have really to do. They have not to recapitulate, but to learn it again. The opinion of Sir Cooper Key as to the teaching and standard in the College is entirely confirmed by what has come before us in the course of this inquiry. Dr. Hirst, on being asked to compare the final examination papers set on board the "Britannia" in 1873 with the corresponding papers set at the College, expressed himself as follows:—

Ev. 223.

"The algebra paper is virtually the same; the difference is not worth speaking of. The geometry is the same. The trigonometry, the practical part of it, at all events, is precisely the same. In spherical trigonometry there is no difference in character. In practical navigation there is the sheet that has been in existence for a long time, what is called the "college sheet." In chart drawing it is the same. In physics, I should say it is slightly simpler, if anything, now than it was then. Those papers on physics appear to include partly what we should now call steam. There is little difference in character in that respect. The sub-lieutenants are not examined in geography or history. On the whole, I should say that the present examination is almost, if not quite, as simple as the one indicated by that paper."

Mr. Oborn, one of the Instructors of the Acting Sub-Lieutenants at the College, states as follows:—

Ev. 954, 956,
957.

"In what state of knowledge do you generally find those acting sub-lieutenants when they come before you; do they seem to have forgotten what they ought to have known, or to have retained it, or to have improved upon it?—I think, speaking in a very general way, they have forgotten everything nearly, but of course there are many exceptions. Taking the test examination, and being guided solely by the numbers shown at the test examination, I think you might say that they had forgotten everything.

"I presume that you set those students when they come to you the same papers as they are supposed to have passed on board the 'Britannia,' when they were about 15; do you think they could do more?—No, they cannot, and they do not.

"They could not do now what they did then?—No, at least they do not do it."

27. It is unsatisfactory that these young officers, after being six years at sea, mostly under naval instructors, and after half-yearly examinations on board ship, should have to recover at the College the knowledge which they carried with them when they left the "Britannia."

28. We have taken the evidence of a lieutenant and a sub-lieutenant who have lately passed through the College, to which we desire to call attention. The lieutenant passed out of the "Britannia" in July 1870, in the first class; and, on leaving the College in October of this year, obtained his promotion to the rank of lieutenant in consequence of the excellence of his examination. He may therefore be taken as a good specimen of this class of students. But he had been fortunate in his career since he left the "Britannia." He was on board the "Trafalgar" for 15 months, where there were three naval instructors, and then went to the flag ship on a naval station, where of course there was a naval instructor, and he continued there during the whole of his time. His account of himself is, that he retained nearly all the knowledge that he brought out of the "Britannia" and advanced it in the "Trafalgar," but not in his next ship. He learned also something of mechanics and hydrostatics, which were not then taught in the "Britannia;" when he came to the College he had already gone through all that he would have to do at the College. He found there all the assistance that he wanted in his mathematical studies. He entered with five others, and they were instructed all together, but some of them could not keep pace with him at all. All of them, with one exception, had private tutors; he himself having one for the whole of the time. He "could not have got up all the new subjects without them." The lectures on Physics were so few that he could not possibly have got his first class certificate in them, or in winds and currents, if he had not availed himself of private tuition. For the last month there was an extra lecture in steam, from 4 to 5 o'clock, twice a week; if he had had the same in physics it would have made a deal of difference. Moreover, on winds and currents there was no lecture for the last two months that he

Ev. 1477,
1478.

Ev. 1481.

Ev. 1500.

Ev. 1534.

Ev. 1563.

Ev. 1538.

Ev. 1548.

was there. He knows an instance of an acting sub-lieutenant who passed out in the first class without a private tutor. He would not have felt confident that he could have done so himself, but he was going in for more than that; he was trying for the Beaufort prize as well.

Ev. 1546,
1548.

The sub-lieutenant passed out of the "Britannia" before classes were instituted, and was for more than four years without a naval instructor, during which time he forgot a good deal. When he came to the College after he had passed through the "Excellent," he did not know as much mathematics as when he left the "Britannia;" he got 854 marks at the final examination; he described himself as industrious and regular. There was not sufficient assistance, and, after what he has seen of the examination, he does not think he could have passed without a private tutor, but if he had had more help, say in the evening, from one of the instructors, that would have made a great difference.

Ev. 1616.
1628.
1630.

Ev. 1648-
1650.

29. At present, looking to the state of knowledge in which acting sub-lieutenants come to the College, and having these two typical cases before us, we cannot feel that the staff of instructors is adequate, and properly arranged with reference to the assistance required by them.

30. We are speaking of course of acting sub-lieutenants who were cadets in the "Britannia" six years ago or more. We are aware that the course of instruction in the "Britannia" has been recently confined to fewer subjects, but whatever may be the result of the change in raising the standard of proficiency attained by the officers entering the college this improvement cannot begin to show itself for six years to come.

31. We bear in mind also that the examinations afloat have only been in operation two years, and Admiral Fanshawe is of opinion, "that the system, as it now exists, if it is left to work, will produce a continuity of education which, he apprehends, will do away to a great extent with the extreme ignorance of some who come here, and who, whether they have been under a naval instructor or no naval instructor have been idle while at sea with reference to those studies which they pursue here;" and Mr. Oborn hopes that under the present system it will be possible to raise the College work in the course of two or three years; "he sees clear indications of this already, and has been disappointed in not perceiving it before."

Ev. 133.

Ev. 1035.

32. There is only one more class of students at the College which it remains to notice, viz., that of naval instructors. These gentlemen pass a preliminary examination, and then go through a course of study not exceeding nine months, at the end of which they are examined in those professional subjects which they will afterwards have to teach. The examination of course determines whether they possess the knowledge required. But something more than that is necessary to show that they are fit for naval instructors on board ship. Aptitude to teach is a gift. It cannot be acquired, and the possession of it cannot be proved by examination. We have had before us the case of an instructor who has made the most praiseworthy efforts to qualify himself for his duties, but who does not seem to possess this aptitude. It seems to us that it would be a good thing if a naval instructor were to be appointed after his final examination, provisionally in the first instance, to work under the supervision of the Director of Studies for such time as may be thought desirable, and he might be usefully employed in assisting to instruct the acting sub-lieutenants. It would then be ascertained whether he had that aptness to teach and personal authority which would make him an efficient instructor when he has to act independently, and to a certain extent under great disadvantages as a teacher in a ship of war. It is possible that the ignorance of the acting sub-lieutenants when they come to this College may in some cases be attributed to the want of these qualities on the part of the instructors.

CHAPTER II.—*What the Remuneration of the Professors and Instructors should be.*

33. The second question referred to us is, "What the remuneration of the professors and instructors should be?"

34. We think that Mr. Lambert should receive 600*l.* per annum, and that his title of assistant professor should be changed to that of professor.

35. We observe that the instructors, Messrs. Laughton (with Solomon, assistant), Oborn, Davies, and Silver, appear to be acting under the immediate orders of the Director of Studies, and that the acting sub-lieutenants, and a certain number (the least proficient) of the royal marine and half-pay naval officers receive mathematical instruction from one or other of those instructors only, and not from the mathematical professors at all.

36. We are disposed to think that it is a disadvantage to these officers, in respect both of education and of the discipline of the classes, that, in the most important part of their studies, they are not brought into contact with the professors.

Ev. 2049.

37. We do not concur in the opinion quoted by one of the witnesses, that the highest mathematical teachers of the College should confine their attention exclusively to the highest mathematical classes. We think that all the mathematical classes would benefit if, once or twice a week, they had lectures from such men as Professors Miller and Lambert, and if the relation between those professors and the teachers of all the mathematical classes were made more nearly to resemble their relation with their own assistants, Messrs. Pole and Gleed. Indeed we go even further than this, for we think that in organizing the College, it is desirable to remove, as far as possible, from the minds of the executive officers of the Royal Navy, who are under instruction in it, the impression that they are simply going through on shore the same sort of instruction as they might have been going through under a naval instructor in a ship of war. The youngest of them are men to whom the idea of going back to school again must be naturally repulsive. The strict discipline of a ship of war cannot be enforced outside it. New associations are needed; the Naval College should stand to the "Britannia," and to the instruction afloat, in much the same light as the universities stand to the public schools, or as the Staff College to Woolwich and Sandhurst. No one can doubt that it would make a serious difference in the minds of undergraduates, if college "lectures" were still called "forms," and if "tutors" and "professors" were still called "masters." When it becomes impossible to insist upon the obedience of boys, it becomes all the more important to neglect no means, through new associations or otherwise, which may arouse the responsibility of men. We have no intention of depreciating the naval instructors; in some subjects it would be very difficult to find gentlemen equally well qualified to teach young officers. But for the general instruction of the College, we prefer new associations, such as are represented by professors, with assistant professors, when necessary, in due proportion to the number of the students.

38. We are led to insist the more strongly upon all that leads officers coming to the College from afloat, to look upon this step as an advance to a higher sphere of instruction, because institutions, whether for the army or for the navy, labour under this inherent defect, educationally, that, unlike public schools and universities, they are not governed by those who teach, or by those who are drawn from the teaching body, so that the teachers everywhere appear to occupy a secondary place in precedence, in salary, in power. These conditions are (perhaps) inevitable, but it requires strong men to hold their own under them, however considerably such a system may be administered by the authorities, and all the support which can be given to the position of the teachers should be given. It is for such reasons we think that a body like the present professors, with juniors of the same stamp under them, are likely to encounter fewer difficulties in achieving the objects, arduous under any circumstances, which the College is expected to accomplish, than men equally able, who bring with them old associations.

39. It is certainly not more economical to employ naval instructors than gentlemen in the position of the present assistants, Messrs. Gleed, Pole, and Solomon.

40. We desire, however, not to be understood to recommend any sudden changes which might prejudice the instructors now at work. We mean only to indicate the alteration of system which we think desirable to introduce, so far as vacancies, or removal to other employment, may offer occasion.

41. We think that if the teaching staff in mathematics, applied mechanics, chemistry, and physics were arranged as professors and assistant professors, with such a relation between the two as we have indicated, the professors might properly be appointed at 600*l.* per annum, and be raised, after five years of good service, to 700*l.* per annum, and the assistant professors appointed at 250*l.* and advance by 25*l.* a year to 500*l.*

In recommending these salaries for the professors, we have had in view the increased attendance which must be required of them if our recommendation in paragraph 37 be adopted.

42. We also think that no one should be appointed, unless by promotion in the College, to be an assistant professor, who is, at the time of appointment, over 30 years of age, nor to be a professor, who is, at the time of appointment, over 40 years of age.

43. We think that the income of the teachers should be made in some degree to depend on the success of those whom they teach, and we think that a certain sum, not exceeding 5*l.*, might be allowed for every officer who obtained three fourths of

the maximum number of marks in certain subjects, or in combined subjects, at his examination on passing out of the College. This sum we should propose to divide among the professors and assistant professors by whom such officers had been instructed in the same subjects, in proportion to the number of the lectures or of attendances after lectures in the studies (*see* paragraph 9), which such officers had received from them, but so as never to add more than 100% in the same year to any salary for the time being. We do not include in this recommendation any branches of instruction which are the subject of occasional lectures only.

44. We think that high academical, or other equivalent distinction ought to be insisted upon in making appointments to both these classes, and we have no doubt whatever that it might be commanded on the terms which we propose.

45. Dr. Hirst has offered certain suggestions for an immediate improvement of the salaries of Messrs. Pole, Gleed, Haddon, and Wills. We do not understand that any question of personal merit only is submitted to us. The principal payments which we think suitable for the duties of instruction are included in the scale in paragraph 41. If that scale be not adopted we see no objection to the whole of Dr. Hirst's proposals, and, in any case, as regards the demonstrators, Messrs. Haddon and Wills, effect might be given to them at once and independently of our scheme. Ev. 551, 552.

46. We think that the voluntary students, at least those of the same naval rank, ought to be classed in their examination. The acting sub-lieutenants are so classed. Ev. 1963.

47. It is an essential part of our recommendations that no person connected with the College, or with the instruction given in it, in any way whatever, should take part in the paid private tuition of the students.

CHAPTER III.—*What courses of lectures should be given in the year, if any, beyond those delivered by the regular professors and instructors, and what remuneration should be allowed for them.*

48. As regards the third question submitted to us, "What courses of lectures shall be given in the year, if any, beyond those delivered by the regular professors and instructors, and what remuneration should be allowed for them?" we have had a difficulty in arriving at a definite conclusion.

49. We think there are many subjects connected with the naval profession on which it may be desirable to give information to officers in the form of lectures, but that while they cannot all be embraced in the course of one session, the particular subjects selected will vary from year to year. The Committee on "the higher education of naval officers" seem to have had lectures of this kind in view when they advocated the establishment of the College at Greenwich rather than Portsmouth, on the ground that "as regards those classes of instruction which it is proposed to add to the College courses, especially physical and experimental science, law, and the German language, it would be easy to obtain in the neighbourhood of London, lectures and practical instruction by gentlemen eminent in the scientific world which would be quite unavailable at the distance of Portsmouth from London, except at a large additional cost, even if available at all." "Command Paper," No. 203 of 1870.

50. We notice that in the original scheme for the foundation of the College, lectures were contemplated in geology and mineralogy; natural history and botany; hygiene, naval and climatic, &c. Scientific investigation and practical experience are constantly arriving at results of great value, which it may be of importance to officers to be made acquainted with, though they may not have studied the particular department of knowledge to which they belong. 1st Report of Committee of 1872, appointed to arrange the details of the Establishment of the Royal Naval College.

51. The subjects in which extra lectures have been actually given appear to us to have been judiciously chosen. They have included international law, magnetism in its technical applications, the atmosphere as a vehicle of sound, meteorology, metallurgy, shipbuilding, marine engineering, fortification and military tactics, and naval history. Among the lecturers have been Mr. Mountague Bernard, Professor of International Law at the University of Oxford, and Professor Tyndall; but the majority of the lectures have been given by members of the college staff. Thus Captain Needham, R.M.A., lectures on modern tactics, and Mr. Laughton gave six on meteorology. The latter gentleman also lectures on naval history. Mr. Oborn gives 30 lectures a year in navigation and nautical astronomy in the regular discharge of his duties. Professor Cotterill gave ten lectures on the strength of materials and structures in the session of 1874-1875, but has given none since. Ev. 297-336.

Appendix,
No. 4., p. 84.

52. The question of remuneration, under these latter circumstances, becomes difficult. There are obvious objections to holding out the prospect of extra payments to officers who are already supposed to be giving their whole time for their fixed salaries. On certain subjects it is impossible to obtain lecturers with the requisite information outside the official class. Thus, Messrs. Morcom and Baskcomb are in the Department of the Controller of the Navy, yet they are also partially employed at Greenwich both as regular instructors and as occasional lecturers. The same may be said of Mr. White, who is paid per lecture on naval architecture, but who lectures on various other subjects from year to year. The three last-named gentlemen occupy a kind of intermediate position between simple members of the College staff like Captain Needham, and Messrs. Cotterill, Laughton, and Oborn on the one hand, and gentlemen like Mr. Mountague Bernard and Professor Tyndall on the other hand, who are wholly independent of the College. Messrs. White, Morcom, and Baskcomb are Admiralty officials who have only certain limited duties to perform in the Royal Naval College, so that further occasional lectures, when given by them, are additional to their prescribed duties in a sense which applies less strongly to officers who are at the College for the performance of whatever duties in their several provinces of study the authorities, advised by the Director of Studies, may call upon them to discharge.

53. We hesitate to recommend that no officer should receive extra payment as a lecturer who is borne on the College staff. Each case must be judged on its own merits, and we are disposed to agree with Dr. Hirst in thinking that, if the subject be closely connected with the salaried officer's own course of instruction, he should, as a rule, give such extra lectures as may be required of him without a fee, provided that his time at the College be not too much occupied, or that suitable provision as to time be made; but that, if he has to depart more or less widely from the precise line of instruction that he has undertaken, and if serious additional labour be imposed on him by the preparation of the lecture during his spare time, then a claim for some additional remuneration may fairly be entertained. In one instance, an attempt appears to have been made to get over the difficulty of extra pay by increasing the officer's permanent salary; but the experiment cannot be said to have been successful, if the result of it has been that the particular lectures to which it applies have been repeated session after session.

54. We agree with Dr. Hirst that, when it is proper to give extra payment at all to officers of the College staff for lecturing, such payment should be made in the shape of a fee for the given lecture; and, if we were called upon to lay down anything approaching to a general rule, we should be disposed to fix such payment per lecture, under these circumstances, at not more than 3*l.* 3*s.*, the choice both of the lecturer and of the subject being absolutely left to the authorities of the College, advised by the Director of Studies, and no sort of vested interest being recognised on the part of any of the permanent officers to be selected to lecture in any particular session, or on any particular subject.

55. But our attention was more specially directed by our instructions to lectures given by gentlemen entirely unconnected with the College, and selected from time to time from their known acquaintance with particular subjects, such as Mr. Mountague Bernard and Professor Tyndall. We see that lectures on the laws of war at sea, and the effect of artillery fire on armour, are proposed to be given during the current year. The interest and the importance of these subjects at the present time need not be insisted upon, and we have no doubt other subjects of equal interest will present themselves from year to year. It is this circumstance that makes it difficult to say beforehand what lectures should be given, or how much the lecturers should be paid. But we think that the requirements of the case would be met, without the necessity of any further application to the Treasury, so long as the payment of 10*l.* 10*s.* per lecture, and the total sum approved for this service in the Navy Estimates, are not severally exceeded. We were informed that Mr. Bernard, besides giving his lectures, had more than 100 papers to look over. If this duty were not imposed, a less fee than 10 guineas per lecture, when the course includes several lectures, might be sufficient.

56. We think that a provision in the estimates not exceeding 300*l.* per annum would meet the cost which it is necessary to incur for occasional lectures, whether they are given by members of the College staff or by others.

CHAPTER IV.—*Whether in any, and if so, in what cases, persons connected with the College or the Admiralty should be allowed to conduct the examinations.*

57. We next come to the consideration of the fourth point of our inquiry, viz., “Whether in any and, if so, in what cases persons connected with the College or the Admiralty should be allowed to conduct the examinations?”

58. So far as the annual examinations of Classes A. and B. are concerned, we find that, under the supervision of Dr. Hirst, they “are conducted by ‘external examiners solely,’ the questions being set and the answers reported upon by persons not on the ‘College staff.’” The examiners have hitherto been gentlemen distinguished in the several departments of learning in which they examined, and the only recommendations we have to make in regard to these examinations are that in those subjects where one examiner is employed he should not be appointed, as a rule, for more than two years, and never for more than three years; while in those where there are two examiners (as the mathematical subjects) they should not be appointed for more than four years, and that no examiner should set papers more than three times continuously on the same subject.

59. The reasons for these recommendations will appear more fully later on in our report. The recommendations may also require to be qualified somewhat in practice as regards subjects in which the choice of examiners is restricted. Thus, in three cases, where the examiners are connected with the Admiralty, “the subjects on which they examine are said to be such that it would be exceedingly difficult to find the same knowledge outside the officers of the Admiralty.”

60. We have now to consider the examinations of Class C., viz., the acting sub-lieutenants. These are very numerous, because the admissions of this class of students take place very frequently, and all who are admitted together are examined six months after admission. The examinations occur usually ten times in the year, and are conducted chiefly by the “permanent examiner,” Mr. Goodwin, under Dr. Hirst’s supervision. Of the eleven papers given on each occasion, Mr. Goodwin sets seven, viz., those on Algebra, Geometry, Trigonometry, Theory of Navigation and Nautical Astronomy, Winds and Currents, Mechanics and Hydrostatics, and Practical Navigation. The papers in the remaining subjects, French, Steam, Physics, and Marine Surveying are respectively set by Professor Cassal, Mr. Hearson (both on the college staff), Professor Rücker, and Mr. Harris (neither on the college staff). From this it will appear that each of these gentlemen sets no less than ten papers of the same character, on the same subject, in the course of each year.

61. But there appears to be some difference in the position of Mr. Goodwin and that of the other examiners; he is a permanent examiner, and every year, as a matter of course, sets the papers on the subjects which fall to him. He was transferred to the Royal Naval College on the abolition of the Office of Director of Education in 1873, under whom he was previously employed. The other examiners do not appear to be permanently engaged. They seem, however, to examine year after year. Thus Professor Cassal has examined for the last three years, and Mr. Hearson since September 1874. Dr. Hirst, however, says that, though he would make no condition at all respecting a change of examiner, “it is better to reserve the power of “changing the examiner occasionally, undoubtedly.”

62. We think that for several reasons the system of permanent examiners, or examiners who set questions continuously on the same subject on many occasions, is open to objections, and these we will now proceed to consider:—

In the first place, it is well known by those experienced in tuition and examinations, that many examiners take different views of the importance of the several branches of the same subject, and direct their questions chiefly to those which appear to them most desirable for the examinees to have mastered. This is especially the case in mathematical subjects, in which one examiner gives most prominence in his questions to such as require on the part of those who answer them a sound knowledge of principles; another looks for clearness and accuracy in writing out the more important propositions; whilst a third assigns most weight to the working of examples illustrating the propositions, and the solving of problems demanding ability and skill.

Again, some parts of a subject, such as particular chapters of the text book used, will almost invariably receive more attention from one examiner than from another. However much he may wish to do full justice to the several parts and branches of a subject, an examiner will generally, though perhaps unconsciously, allot most space and credit to questions upon those which he considers the most important, though

Ev. 56.
408–422.

Appendix,
Nos. 2 and 3.
pp. 81 to 83.

Ev. 415.

Ev. 432.

Ev. 426.

Ev. 491.

Ev. 577.

other portions may rank equally high or higher in the estimation of another examiner. There will be a similarity in the papers he has set which cannot escape the eye of a careful observer, and a study of these will be a great help to students about to present themselves for one of his future examinations. Thus, in answer to the question, "Do you not find that the examiners get into a groove when they have examined for several years, and that the men become so familiar with their papers that they have a good notion as to what questions will be set?" Dr. Hirst replied, "No doubt that is more or less the case with all examiners."

Ev. 580.

63. Under such a system, it is only natural to suppose that the instructors will direct the attention of their pupils more especially towards those parts of a subject which they believe will prove of most advantage to them in their examination.

64. This system also gives students who read with private tutors a signal advantage over others who rely on their own exertions and the assistance they receive from their appointed teachers, for it is the special business of the private tutor to predict what kind of questions are likely to be set. In this respect he is regarded by his pupil as a sort of prophet, and his counsel rigorously followed. In this particular department of his business, the Greenwich private tutor possesses unusual advantages owing to the many examinations which those who examine the sub-lieutenants undertake. Thus Mr. Goodwin alone sets the greater part of the questions for the "Britannia," the junior officers afloat, the dockyard schools, and for assistant clerkships, and so on. With such a large number of questions before him, an astute and experienced private tutor, when preparing his pupils, would have no difficulty in eliminating some portions of a subject as "not likely to be set" whilst cramming them with others with all the skill at his command. "They try to cram them as much as they can," said one witness who had himself undergone the treatment at the hands of two private tutors.

Ev. 1588.

Ev. 1504, 5.

65. On this point Dr. Hirst remarks, "No doubt the private tutors study the questions which have been set in previous examinations very closely," and we can fully realise the truth of Mr. Oborn's statement when speaking on this question with reference to the sub-lieutenants. He says, "Instead of following the proper course of study they are disposed to work at whatever is set them by their private tutor, and I have often seen indications that that is rather following a course of examples taken from the examination papers instead of from the text books or doing the subject properly, and often I can see that their attention is off from the lectures and the work of the class room, and on that set them by the private tutors."

Ev. 489.

Ev. 1026.

66. We doubt whether the system adopted at Greenwich of keeping on the same examiners is maintained to a like extent elsewhere. At the Universities, examiners are rarely appointed to examine in the same subject for more than two years, and in the public and other schools, in examinations of importance, the examiners are frequently changed. We are of opinion that it is a direct encouragement to cram, and the longer it remains in force the more will it cause the private tutor's services to be prized and sought after, for it is only natural that a student will put faith in one who for years has carefully studied the questions set by those about to examine him. We can even understand that students who know that they can secure the assistance of teachers possessed of such advantages, during the months immediately preceding their examination, "will neglect their studies during the earlier months" and waste time in the ordinary study hours.

Ev. 233.

67. Were the examiners changed at short intervals of time, the passing of their examinations would no doubt require on the part of the sub-lieutenants a more thorough preparation, at least in the cases of such as have hitherto mainly relied on the assistance of private tutors. This would compel them to pay more attention to the instruction which they receive in the College, which we can quite understand is, as Dr. Hirst says, "far better for them than what they receive outside." Private tutors will always exist where, as is the case amongst the sub-lieutenants, a good deal of personal explanation is necessary, and where examinations are held on which important results depend, but those examinations should be so arranged as to deter, as far as possible, students from following the narrow groove so frequently prescribed by private tutors instead of trusting to the knowledge derived from systematic public lectures, and a thorough study of their text books. At Greenwich the system of permanent examiners appears to us to be calculated to produce the very opposite results, and to make the business of a private tutor flourish.

Ev. 234.

68. We are aware that the position of Greenwich, with regard to the examinations of acting sub-lieutenants, is exceptional, on account of their taking place so often, and that it would be difficult to adopt there the system in practice at other large institutions

—where there is only one annual examination of importance—of a frequent change in the examiners. We think, however, that much may be done towards improving the present system, and that it is desirable that action should be taken on this subject, and with this view we beg to submit the following recommendations for the consideration of their Lordships.

69. We are of opinion that four gentlemen of good university standing, experienced in examining, but not connected with the College, should be appointed for a period of two years to examine the acting sub-lieutenants in algebra, geometry, trigonometry, physics, and mechanics and hydrostatics, and that each should set five papers on every one of these subjects during that period, and should look over and mark the answers to them.

70. We further recommend that four gentlemen, naval instructors or otherwise, should be appointed for a period of two years to examine the acting sub-lieutenants in steam, theory of navigation and nautical astronomy, practical navigation, winds and currents, and marine surveying, and that each should set five papers on every one of these subjects during that period, and should look over and mark the answers to them.

71. By this plan, 20 examination papers per subject would be produced, sufficient for the examinations of two years, at the rate of 10 examinations (the existing average) per annum.

72. We think that the first staff of four examiners should be constituted by appointing two of them for two years, and the two others for one year only, all appointments to regular vacancies being made for two years. Two new examiners will thus succeed in each year after the first. Casual vacancies should be supplied by the appointment of examiners to act only during the period assigned to the examiners whose places they fill.

73. We do not consider it of equal importance that the examiner in French should be so frequently changed. We also think the present arrangements for awarding the marks for proficiency in "taking sights" may remain as they are.

74. The examiners should be furnished with particulars respecting the course of instruction pursued, the text books used, and the per-centage of marks required to pass in the several classes. Considering that some of the acting sub-lieutenants have had little instruction when afloat, and that their time there must have been chiefly employed in acquiring a practical knowledge of seamanship, the examiners should be enjoined to set a fair proportion of easy questions, and to seek more for a sound knowledge of a subject, with a constant view to its practical application in the service, than for the power of solving intricate problems which few can accomplish without long-continued previous practice.

75. The examiners should be appointed by their Lordships, who would doubtless consult the Director of Studies on their appointment, and all papers of questions should be submitted to him for his observations. It should not be publicly known before the examinations what subjects had been assigned to the several examiners.

76. If the preceding part of our recommendations for the appointment of examiners be adopted, as well as that part of our Report wherein we recommend a re-organisation of the clerical establishment, we think that Mr. Goodwin's services, in connexion with the College, may be dispensed with, provided that the duty of superintending the monthly and other examinations be entrusted to one or other of the Examiners in such rotation as may be decided on.

77. We believe that if such a change as that we have sketched out be introduced into these examinations, more life, spirit, and interest will be infused into the work of preparing for them, both as regards the instructors and students, and that the private tutors, if not wholly got rid of, will be less frequently resorted to, and, at any rate, will be forced to advance the character of their teaching. The monotony which must always more or less attend the labours of the instructors would be relieved by the light and freshness thrown into the papers by the change of examiners, and when it became known, as would soon be the case, that to obtain the rank of lieutenant less reliance must be placed on a final cram, a healthy stimulus would be given to the studies of young officers both afloat and ashore.

78. We have now to consider the other examinations connected with the Royal Naval College which come under the supervision of the Director of Studies.

They comprise the examination of—

- (1.) Candidates for naval cadetships.
- (2.) Cadets on board H.M.S. "Britannia."
- (3.) Junior officers afloat.

- (4.) Candidates for naval clerkships.
- (5.) Candidates for naval instructorships.
- (6.) Candidates for interpreterships.
- (7.) Engineer students and shipwright apprentices in the dockyard schools.

79. We will first consider (1.), (2.), and (3.), the examinations for whom take place each year in January and July.

80. At the present time the duty of examining these devolves chiefly on Mr. Goodwin, who has, however, the assistance of Mr. Smith, the chaplain and naval instructor of H.M.S. "Duke of Wellington," and Mr. Fowler, a retired naval instructor. It may be mentioned that Professor Cassal examines in French, Mr. Bowler in drawing, and Professor Rücker in physics.

81. For (1.) 10 examination papers are set annually, and 645 sets of papers were looked over in the year 1875.

82. For (2.) and (3.) the corresponding numbers are 63 papers set, and 2,340 looked over, and 22 papers set, and 1,500 looked over, respectively.

83. Thus, for (1.), (2.), and (3.), 95 papers are set annually, and 4,485 sets of papers were looked over in 1875.

84. Of the examination papers, 47 appear to be on mathematical subjects (including physics), 20 on navigation and chart drawing, 12 on French, 2 on perspective, and the remainder on Scripture, Latin, and Grammar.

85. We are of opinion that the gentlemen who examine the sub-lieutenants should undertake these examinations, under the supervision of the Director of Studies, who should arrange the subjects which should be assigned to each examiner. For the examinations for Naval cadetships, we think that the services of two of the University examiners would be sufficient; for those of the cadets in the "Britannia," the services of two of the University examiners and two of the examiners in professional subjects would suffice, independently of the examiner in French, in both cases. Considering what very important results depend on the examinations of the cadets in the "Britannia," we think that where it is practicable, as in the mathematical subjects, the examiners should have had experience in examining young boys. This end could always be secured by appointing gentlemen who had examined the public schools or taken part in the middle-class examinations connected with the universities. We think it necessary to mention that care should be taken that none of the questions set are beyond the course of studies pursued by the cadets.

86. We find that at present the junior officers afloat are examined twice annually in the same subjects, during the period they are at sea, between the times of leaving the "Britannia" and joining the College at Greenwich. Thus in five years, these young officers have 10 examinations similar to each other, in mathematics, French, and professional subjects, 11 papers being set on each occasion.

Ev. 1257. 87. "Each set of papers has exactly the same difficulties as those set in the previous year." Under such conditions, the studies of midshipmen and acting sub-lieutenants must be painfully monotonous, and every year become more tedious and devoid of interest. Although we are not in favour of attempting to educate the whole class of these young officers very highly, we think their mathematical studies should be steadily and continuously kept up, so far, but only so far, as is compatible with their learning thoroughly and practically the details of their profession.

Ev. 276. Dr. Hirst remarks, when speaking on the advantages of mathematical study to naval officers, "amongst other things it promotes steadiness of purpose and habits of precision. They derive also a direct advantage from it, for they cannot open a book now on physics, on steam, on navigation, in fact on any of the subjects in which they are most interested, which is not full of mathematical formulæ."

88. Whilst, then, we fully approve of a system which makes it necessary for young officers when afloat to keep up the sound elementary knowledge which they should have acquired in the "Britannia," we think there ought to be some variety in the studies which then occupy their attention, and that these should be, at least in a small degree, of a progressive character. This result might be attained by giving, at the half-yearly examinations, questions on selected portions of each subject studied in the "Britannia" in addition to those on the groundwork. These selected portions should be a little in advance of what had been read in the "Britannia," and they might form part of the examination twice consecutively, all young officers of approximately the same standing being examined in the same papers. As statics and hydrostatics are comprised in the Greenwich course of studies, the elementary parts of these subjects might, by easy gradations, be introduced into the examinations.

89. Although at the present time Mr. Goodwin, with assistants, sets the papers at the two half-yearly examinations, they look over the results of the July examination only, the others being looked over by the Naval Instructors on the several stations. We think that the papers should on both occasions be looked over by the gentlemen appointed to examine, and the results published to the Fleet once a year, as soon after the July examination as is practicable, the places of the officers in each year being arranged in classes and determined by the aggregate of the marks obtained in the two consecutive examinations. Rewards should be given to those who most distinguish themselves in the class lists, and a note should be attached to the name of every officer certifying how long he had had the advantage of instruction on board ship.

Ev. 135,
2106.

90. We desire to notice here that, if our recommendations for the appointment of examiners be adopted, Dr. Hirst's time will be set at liberty for what we cannot but regard as the most important part of his duties, viz., frequent personal visits to the several classes under instruction in the College, to the "Britannia," and to the Dockyard Schools.

91. We think that each Naval Instructor should make a report at the end of each half year to the officer in command of the ship on board which he is serving, and that this officer should forward a copy of this report with his own observations, to the Admiralty.

92. We have heard different opinions respecting the amount of time which a midshipman may bestow on his studies when afloat, due regard being had to his devoting so much attention to seamanship and professional duties as will ensure his obtaining a thorough acquaintance with these most important parts of his education. No doubt in some small ships, where many duties are thrown on a young officer from which he is free in large vessels, the time for study is necessarily small, but in the Channel and Flying Squadrons, "where a large proportion of the whole of the midshipmen in the service are serving," all the ships in which carry naval instructors, it seems to be considerable, and is greater than that assigned to mathematics in many schools. Mr. Goodwin thinks that, under favourable circumstances, "a ship which averaged seven and a half hours a week would be doing very well indeed, and might be taken as a very fair example of the amount of study in the whole fleet." This is borne out by the Report of the Committee of 1870 on the Higher Education of Naval Officers, which devotes a chapter to the system of tuition on board ship. Captain Curme, on the other hand, says that in his ship, "the midshipmen had, on an average, 15 hours a week of good work," and "that he allowed nothing to interfere with their school hours." Adopting the former of these two opinions, which supposes the midshipmen to be studying, on the average, for one and a half hours for five days in the week, it seems probable that under an efficient and painstaking instructor they could not only keep up the groundwork of knowledge which they had acquired in the "Britannia," but also go considerably beyond it. It must not be forgotten that midshipmen, like most other youths, require some encouragement and competition to make them work with zest and perseverance; indeed, in their case, these powerful stimulants to industry are especially necessary, owing to the interruptions to which their studies are subjected. We are inclined to think that had they the incentives to study which others of their age usually enjoy, but of which they are now almost destitute, many of them would employ their working hours more profitably than they do at present. Admiral Ryder in his evidence before the Committee of 1870 on the Higher Education of Naval Officers, when speaking on the studies of the midshipmen, observed "a great deal of time that might be used for purposes of study is often wasted," and this is not surprising considering how small are the motives which induce them to work.

Ev. 970.

Ev. 1302.

Ev. 1301.

Ev. 1394.

93. In making these remarks we repeat that we have no desire to attach undue importance to a midshipman's theoretical education; but what we wish is, that he should receive encouragement to make better use of the time which is allotted to him for study. We are fully aware that his main object, when afloat, should be to acquire a thorough practical knowledge of his profession, and to become so inured to the duties and responsibilities which devolve on a naval officer, that in due course of time he may, with safety, be entrusted with the charge of one of Her Majesty's ships.

94. We, at the same time, look upon these examinations afloat as very important; they ought to stimulate both instructors and young officers at times when the Greenwich examinations are far distant, and we agree with one witness who considers that "more should be made of them." Admiral Fanshawe's opinion on this point has been already quoted. (See paragraph 31.) Mr. Oborn says, in answer to the question, "Do you anticipate benefit from the establishment of these examinations?" "Yes, much; and I perceive it, I think, already. I think there are clear indications of

Ev. 1582.

Ev. 982.

Ev. 2053. "improvement in the test examinations on entry in the last four months. At any rate, they are better, and I can attribute it to no other cause." Again, "If they are properly carried out most certainly they ought to be of very great value, but if they are carelessly carried out they are useless."

Ev. 274, 275. 853, 854. 860-862. 882-889. 954, 991. 1398. 95. We cannot here refrain from expressing our strong opinion that the course of studies which the cadets are required to undergo in the "Britannia" should not exceed that which boys of their age, of average capacity, can thoroughly understand and master. We have had much evidence to show that officers, when they join the College at Greenwich, are ignorant of the very elements of mathematics, and this would scarcely be possible, had their studies, when in the "Britannia," been confined to acquiring a sound knowledge of the groundwork of the subjects which they were taught. "As a rule they have so utterly forgotten what they learnt in her, that it would be difficult to say that they had learnt anything."

96. We refer here to our preceding recommendation that the Director of Studies should frequently visit the "Britannia."

97. We agree with Dr. Hirst in thinking that the examinations of (4), candidates for naval clerkships, should be placed in the hands of the Civil Service Commissioners, to whom also might be entrusted those of (5) and (6), candidates for naval instructorships and for interpreterships. We consider it desirable that these examinations should be undertaken by persons unconnected with the College.

Ev. 45. 464. 98. We now arrive at the examination of (7), the engineer students, and apprentices in the dockyard schools. These are "very important;" those in July, being in Dr. Hirst's opinion, "of extreme importance." With the view of enabling the Committee to form a better idea of their nature and requirements, Mr. Gordon, Mr. Morgan, and Mr. Loveless, accompanied by Mr. Merrifield, late Principal of the Royal School of Naval Architecture at South Kensington, visited the dockyard school at Portsmouth, and were present during the examination held there on January 16th. They had an interview with the masters of the school, who afforded them much information respecting the character and details of the examinations. They found 158 present, of whom 100 were dockyard apprentices, and 58 engineer students. All were in one room, under the superintendence of the chaplain of the dockyard. The supervision was necessarily imperfect, it being impossible for one person to exercise a proper supervision over so many. Although the arrangements were as well planned as the size of the room would permit, the boys were seated too near each other, and, in many cases, had they wished to copy, either from their neighbours or from books, they might have done so without much fear of detection. We think that additional space and supervision are urgently needed. We have received information which leads us to think that these evils are not confined to Portsmouth.

99. The system of examinations for these schools is, in some respects, similar to that in force amongst the junior officers afloat. All the students in the five dockyards, about 500 in number, are examined half-yearly in the same papers on the same subjects, with this reservation, that during their first three years they are not examined in professional subjects. The papers on all these occasions are of a uniform standard, being always of about the same degree of difficulty. In January, there are six papers set, one on each of the following subjects,—arithmetic, algebra, geometry, trigonometry, conic sections and differential and integral calculus, and mechanics and hydrostatics. In July, in addition to one paper on each of the foregoing subjects, there are others on physics and chemistry, English grammar and composition, geography and history, and French, besides several on professional subjects, as engineering and shipbuilding.

100. From this it will be seen that a student who remains five years at school is examined ten times in the mathematical subjects, five times in the English subjects and French, and twice in professional subjects; the whole of the papers on each subject being very similar in character. After every examination, the engineer students of all years are classed together in order of merit, those in different years competing against each other, so that a boy in his second or third year may take a higher place in the class list than one in his fourth or fifth, a result which not unfrequently happens. Exactly the same remarks apply to the apprentices. The consequence is that the class lists represent heterogeneous medleys from which it is impossible to unravel any tangible or useful conclusions. Thus, a boy in his first year at Chatham beats one in his fourth at Portsmouth, and a boy in his first year at Portsmouth beats one in his fourth at Chatham. A boy in his second year beats others in their third, who beat others in their fourth, who beat another in his fifth, all the boys being in the same dockyard. Numerous examples, equally curious, of the anomalous results which follow this singular method of examining and classifying can be found in the lists.

These results have no effect upon the prospects of the competitors. Those who obtain the highest places early in their career gain no precedence over the seniors whom they surpass.

101. We cannot see the advantage of this system, but, on the contrary, believe that it must act injuriously on both the boys and masters. For a senior boy, who has been studying advanced subjects, to be beaten by one younger than himself, and whose reading has been much more limited, cannot be a very healthy incentive for either. The former must be greatly discouraged, the latter unduly stimulated.

102. The competitive examination for admission into these schools is confined in mathematics to arithmetic, and certain parts of Euclid and algebra. Indeed the age, 14–15, of the boys, would of itself exclude more mathematical knowledge. Nevertheless, in about a year after admission, the papers put before them embrace all the mathematical subjects which have been mentioned. It is obvious that it would be impossible for any boy in one or two years to read properly all these in the time allotted to study in the schools, but it is not unlikely that ambitious boys might be strongly tempted to cram up parts of subjects higher than those in which they had been instructed, in the hope of thus securing higher positions in the class lists. As one of the masters admitted, the system “leads to cram.” Moreover, as is only natural, there is considerable emulation between the dockyard schools respecting the places gained by their respective pupils, and it is therefore to be expected, considering the large number of marks given for higher mathematics, that the masters will press forward clever boys faster than is expedient, in their desire to obtain credit for their schools.

103. Further, it is scarcely necessary for us to observe that examinations of such a character must become excessively wearisome for all, and especially for the elder and more intelligent boys. Frequent examinations, with but little variety in the papers, in arithmetic, Euclid, algebra, history, geography, and grammar, are, to say the least, unnecessary, and certainly not calculated to advance the expansion and improvement of the minds “of those who represent the highest intellect of the constructive department of the Navy,” or, indeed, of any others.

Ev. 194.

104. When we reflect that the objects of these examinations should be to test thoroughly the knowledge of the engineer students and dockyard apprentices, to encourage them to study, and to enable the authorities to select the best qualified amongst the latter for a higher course of reading at Greenwich, and that the importance of affording to these young men a sound and elaborate training cannot be over estimated—(for in many cases, shortly after completing their education, they have to assume duties and responsibilities which, in the present conditions of engineering science and shipbuilding, demand the highest professional knowledge and skill—in shipbuilding “practical problems constantly arising involving the very highest mathematical knowledge”)—we feel that these examinations should be conducted by the most competent examiners, and devised so as to lead the students to aim at acquiring an accurate and extended knowledge of all the subjects necessary for them to learn.

Ev. 709.

105. We, therefore, beg leave to recommend to their Lordships that the mathematical parts of these examinations should be entrusted to the gentlemen who undertake the final examinations held at the College in June, who would be persons perfectly well qualified for the purpose. If necessary, they might have the assistance of two of the gentlemen who examine the sub-lieutenants. The instructors in the College might continue to afford assistance in the dockyard (July) examinations, taking the papers in grammar and composition, geography, and history.

Ev. 462.

106. We think that the professional parts relating to shipbuilding and engineering should be left in the hands of gentlemen connected with the Admiralty, who would probably be better qualified for these important duties than any others.

107. We further recommend, that during the first three years, when the boys devote more time to study than afterwards, their examinations should be of a strictly progressive character, the papers set at each being mainly on the subjects read in the half-year preceding it. Supposing fresh subjects to be read each year, and that two examinations are held per annum,* the papers in January should embrace the earlier parts of the year's course, whilst those in July should embrace the whole course read during the year. The aggregate of the marks obtained at the two examinations should establish the places of the students in the July list.

108. By this means, we believe that the instruction imparted to the boys would be better gauged, and a more thorough and lasting knowledge acquired.

* See Memoranda by Mr. C. W. Merrifield, page 88, and by the Reverend Osborne Gordon, B.D., page 89.

109. At each examination, a general paper of examples and easy problems on all the mathematical subjects previously read, might be given to encourage the students to obtain a deeper acquaintance with them, but it must be remembered that the study of mechanics, conics, and the calculus, necessarily implies constant practice in arithmetic and elementary geometry, algebra, and trigonometry, and a student's proficiency in these may be clearly tested by the manner in which he acquits himself in higher subjects. By the end of their fourth year, the students would probably have completed their course of study, after which the papers might be entirely of a general, though slightly progressive, character.

110. We are also of opinion that the students in each year should be classed separately in the lists, giving the results of the examinations, a further division being made into engineer students and apprentices as at present.

111. The question of permitting boys who are more forward than the others in their year to be raised into classes composed of those senior to themselves, and reading more advanced subjects, has been brought before us. We are disposed to think that if the subjects for study for each year be judiciously selected the reading of the boys in any particular year, certainly of those in one of their first three years, should be confined to the subjects of that year. For instance, it is undoubtedly better for a boy of 15 or 16 to continue working at algebra and trigonometry until he can solve problems in these subjects with tolerable facility than, with an imperfect acquaintance with them, to be pushed on to the calculus, merely because he has shewn himself superior to the rest of his class. The two former subjects present an ample field to occupy the cleverest boy with advantage to himself for at least a year, so far as his mathematical training is concerned. The more advanced in each year might always be taken in a class separate from the others, and the fact of the boys in the several dockyards competing against each other would ensure a wholesome amount of emulation even amongst the best of them.

112. We think that some additional encouragement to study should be held out to these youths, especially the apprentices, of whom very few can look forward to the more advanced course at Greenwich. This was represented to us by the schoolmasters at Portsmouth, and we venture to suggest to their Lordships that a small increase of pay should be made to those who acquit themselves with credit in the examinations.

113. Although the general condition of these schools is beyond the scope of this inquiry, we feel bound to call the attention of their Lordships to the necessity of their being maintained in a state of thorough efficiency. Considering the large number of students who attend them (at present about 500), the extensive range of subjects which they are expected to read, and the importance of the instruction being perfectly adequate to the requirements of the boys, we beg leave to submit that they should continue to be inspected by the Director of Studies at least twice a year, as we understand is now the case, and that their organisation, staff of teachers, and courses of study deserve the most careful attention and consideration.

114. In recommending that the cadets, the junior officers afloat, and the sub-lieutenants, should be examined by the same gentlemen, we have been guided by the principle that the papers set each year to these several classes of officers should be in a moderate degree of a progressive character. We think this is desirable both as a means of stimulating them to work as well as rendering their reading more harmonious and interesting. We have also kept this principle in view in suggesting that the examinations of the dockyard schools and the final examinations of the College in June, should be entrusted, as far as practicable to the same examiners, at least where they concern the engineer students and selected apprentices. It is true that the scheme which we propose would require a larger number of papers to be set than at present, but we regard this as a matter of no moment in estimating what is likely to prove of most value to the service. In the cases of the junior officers afloat and students in the dockyard schools, carefully prepared courses of study should be drawn up for the young men in each year, and the examination papers set on them. Three or four mathematical papers would probably suffice for those in each year at each examination, and this number might perhaps be reduced in some cases, by dividing a paper into sections. We do not apprehend that there would be any difficulty in the practical working of the scheme if it were placed in the hands of a competent and responsible gentleman at Greenwich, and we have reason to believe that well qualified examiners might easily be found.

CHAPTER V.—*What should be the remuneration to the Examiners.*

115. We think that the payments made to the gentlemen who undertake the final examinations at the Royal Naval College at the end of each Session should remain as at present, with the exception of that to the Examiner in Physics, which we are of opinion should be a fixed annual fee of 30*l*. Appendix,
Nos. 2 and 3,
pp. 81, 83.

116. From information furnished to us by the Secretary of the Cambridge University Local Examinations, and by one of the secretaries of the Oxford and Cambridge School Board Examinations, as well as from other sources, we have drawn up the following Table of Fees, which we consider adequate for the services of the Examiners who would undertake the duties of examining the Candidates for Cadetships, the Cadets in the "Britannia," the Junior Officers afloat, the Acting Sub-lieutenants, and the Engineer Students and Apprentices, at the Dockyard Schools.

117. The following sums are suggested, irrespectively of the usual allowances for subsistence and locomotion, in cases where personal attendance is required. (See paragraph 76.)

University Examiners. £

118. Each of two Examiners who examine Candidates for Cadetships, Junior Officers afloat, and Acting Sub-lieutenants should receive annually - - 70

119. Each of two others who examine the Cadets in the "Britannia," the Junior Officers afloat, and the Acting Sub-lieutenants should receive annually - 100

Examiners in Professional Subjects.

120. Each of two Examiners, who examine the Junior Officers afloat and the Acting Sub-lieutenants, should receive annually - - - 35

121. Each of the two others, who examine the Cadets in the "Britannia," the Junior Officers afloat, and the Acting Sub-lieutenants, should receive annually - 50

Examiner in French.

122. The Examiner in French of Candidates for Cadetships, the Cadets in the "Britannia," Junior Officers afloat, and Acting Sub-Lieutenants should receive annually - - - - - 85

Examiner in Freehand Drawing.

123. The Examiner in Freehand Drawing, of Cadets in H.M.S. "Britannia," should receive annually - - - - - 20

Dockyard Schools.

124. The gentlemen who examine these schools in Mathematics and Physics should receive annually in the aggregate (see paragraph 105) - - - 120

125. The Examiner in French should receive annually - - - 25

126. We think that the Examiner in Descriptive Geometry should receive annually - - - - - 20

CHAPTER VI.—*Clerical Establishment.*

127. We consider the cost of the clerical establishment of the College excessive, and that the arrangement of duties leads to unnecessary expense.

128. By the return (page 86) it appears that the present staff consists of two senior clerks, a storekeeper and cashier, a clerk, and a writer. Their present salaries amount in the aggregate to 1,908*l*., and will eventually reach 2,260*l*. a year, and three are in occupation of official residences. The Committee of 1872, in their first report on the organisation of the College, estimated the cost of the clerical staff at 1,000*l*. a year.

129. These five gentlemen deal with four independent branches of work :—

(a.) Messrs. Raven, senior clerk, and Cherry, clerk, are employed, immediately under the President, for secretariat duties, including all matters connected with the internal arrangement of the College :

(b.) Mr. Huskisson is cashier and storekeeper :

(c.) Mr. Main, senior clerk, is employed, under the Director of Studies, in copying reports, &c., and tabulating results of the examination of dockyard schools, H.M.S. "Britannia," candidates for cadetships, and examinations not directly connected with the College (with the exception of acting sub-lieutenants) :

(d.) Mr. Buller, established Admiralty writer, is employed, under the Director of Studies, in copying reports, &c., tabulating results of examinations, recording arrangements of classes, and all other duties connected with the students of the College.

130. We recommend that the clerical establishment of the College be amalgamated under the direct supervision of a senior clerk, who will act as secretary to the President.

131. Our general recommendations would necessarily lead to a reduction of the present clerical duties of the Royal Naval College. It does not appear that there are any duties to warrant the employment of two Senior Clerks there with salaries from 400*l.* to 600*l.* a year.

132. We recommend that Mr. Buller, whose duties are not such as should be entrusted to a writer, be appointed a clerk of the lower division, on the scheme recently adopted in certain departments by the Civil Service, with 50*l.* a year "duty" pay; this will give him a suitable position, and be a slight increase in his salary, to which we think he is entitled.

133. Under this arrangement we are of opinion that the remaining staff will be sufficient to undertake all the clerical duties connected with the President and the Director of Studies. We would, however, suggest that the President have the power of obtaining the services of a copyist from the Civil Service Commissioners, from time to time, as he may consider necessary.

CHAPTER VII.—*As to Subjects of Study other than purely mathematical.*

134. From the nature of our instructions, we have not, as already stated, thought it our duty to comment in our Report on the course of study laid down for the various classes of officers. But we believe it may be useful to the Admiralty to append the following brief summary of opinions we have formed during our inquiry on the general scope and direction of the instruction afforded at Greenwich. We have taken no evidence directly on this question. It must, therefore, be understood that our remarks are only such as are dictated by the casual observations and references which were inevitable from the intimate relation of our inquiry to the wider question of the character of instruction best fitted for the object in view.

135. The instruction at the Naval College for all branches of the service, while it embraces many subjects, is nevertheless undoubtedly essentially mathematical; that is to say, the backbone of the course consists of mathematics. To success in that study is awarded the largest proportion of marks; and other subjects, not purely professional, must therefore be looked upon rather in the light of accomplishments.

136. We take it that the object of the College is twofold,—primarily, to increase the technical knowledge and skill of naval officers; and secondarily, by cultivating their general intelligence, to improve their aptitude for the various duties which a naval officer is called upon to perform under the most diverse circumstances, and in most difficult positions.

137. We have already quoted Dr. Hirst's opinion on the subject of the study of mathematics, with which we fully agree; and it is scarcely necessary for us to say that we in no way desire to depreciate the importance, or undervalue the direct bearing, of mathematics on the professional acquirements of naval officers. But it must be remembered that to a large class of minds mathematical or analytical reasoning is entirely foreign. The use of the higher mathematics, especially, as a tool is never thoroughly grasped by them—never grasped in a form to be afterwards applied. Such minds are deficient in that power of abstract reasoning which the use of mathematical symbols implies, or they cannot attain any facility in their manipulation. The want of this power is undoubtedly, per se, a great drawback. The more complex a problem, which is stateable in terms of number or form, the more valuable, if not necessary, becomes the application of mathematical analysis. And when the facts or data are very numerous or interdependent it becomes impossible to deal with them to any purpose without its aid. Our argument goes only to this extent, that faculties which are forthcoming should be made the best of, and not be wasted in the endeavour to confine them to uncongenial uses.

138. Now, it must be admitted that the technical duties of a seaman and of a naval officer—if we leave out of consideration the more abstruse problems connected with nautical astronomy, navigation, shipbuilding, and gunnery, with which comparatively few naval officers can ever be called upon to deal—necessitate but a limited knowledge of mathematics, and that an intelligent apprehension of the principles on which the technical rules of the profession are founded may be obtained with a good knowledge of arithmetic, and the elements of algebra, geometry, and trigonometry.

139. The branches of science with which in his professional duties a naval officer is most likely to have to deal are physics and applied mechanics.

As regards physics, it cannot be said that a knowledge of mathematics, beyond the elementary branches we have specified, is necessary in order to understand those parts of essentially experimental sciences, which are in practice the most valuable.

As regards applied mechanics we may quote the opinion of Professor Goodeve, himself an able mathematician :—

“ Granted that those who in recent years have invented and developed the machinery of our workshops, that such men as Whitworth, Clement, and Roberts have laboured without any assistance from abstract theoretical knowledge, and with the help only of their own natural genius in reasoning logically upon what they have observed; granted that the creative minds of Watt, Telford, and Stephenson, although never trained to the study of mathematics, have given us our steam-engines, our canals, and our railways; and it must surely be conceded that there is an enormous field of useful mechanical knowledge in which a man may work successfully for the good of others without being competent to follow the symbolical reasoning of a mathematical treatise. Can it be denied that the principles of mechanics have been understood by those who have shaped and fashioned with their own hands the very subject-matter which gives the science a real existence? And are we not compelled to admit that the path which these men have opened out so successfully may be safely trod by hundreds of the mechanics of our workshops, who will be enabled, when properly guided, to understand and master the solution of many a problem of engineering, and to comprehend many a complicated piece of mechanism, with no further aid than that derived from patient thought upon the principles involved, and a careful comparison of the successive steps which have led previous inventors to the complete and final result?”

140. Again, there is no acquirement which is more likely to be of practical use to a naval officer than a knowledge of modern languages, modern history, political geography, and the outlines of international law. In dealing with foreigners in all parts of the globe, whether it be the natives of the ports visited, or the officers of foreign navies with whom he is brought in contact, a knowledge of modern languages must be of immense importance. That an officer who often has to act on his own judgment in delicate questions of international law, of vital importance, not only to himself but to his country, should have every assistance which a knowledge of the broad principles of that law can afford him, is evident.

141. Is it, then, advisable to make the instruction in what may be termed the Staff College—the instruction, that is, of half-pay officers—so exclusively mathematical? It will, for the reasons already stated, we believe, be admitted by all mathematical teachers that on a large proportion of men, however intelligent in other lines of thought, higher mathematics are practically thrown away. They may afford a kind of mental discipline, but they are never assimilated in a form to be applied.

142. As it is very soon discovered who can and who cannot be trained mathematically to any good purpose, we would suggest for the consideration of the Lords Commissioners of the Admiralty, whether it would not be of advantage to the service and to the country to afford an opportunity for those officers who are found to have no aptitude for mathematical reasoning, but still are anxious to study and improve themselves in the intelligent exercise of their profession, to turn their attention to experimental physics,—a subject which, when taught systematically and practically, is so well calculated to increase the powers of observation,—and to practical mechanics, as well as to modern languages and international law, so as, while requiring from all officers strict proof that they have acquired the indispensable minimum of mathematical knowledge, to give to those other subjects an alternative and equal value to that which is now assigned to higher mathematics.

143. Our observations, which, as we have said, must only be regarded in the light of suggestions for further consideration, are not intended to apply to the course for sub-lieutenants, so long as the minimum therein required is restricted to such a knowledge of mathematics as is absolutely essential for an intelligent carrying on of the simple professional duties of a naval officer.

144. We wish also to guard ourselves against recommending a course of study which should be chosen simply because it was easier. It is part of our recommendation that the standard of examination in physics, mechanics, languages, and law, should be such as implies in the student who passes it successfully both diligence and aptitude for the study selected.

145. We cannot help also suggesting, with regard to the examinations afloat, how much might be made of questions which obliged the young officers to study closely and intelligently not only books, but the mechanism itself (structure and engines) of the vessels in which they were serving.

CHAPTER VIII.—*Summary of Recommendations.*

146. Although our recommendations will be found under the chapters to which they severally relate, it will be convenient for reference to summarize them in the order in which they stand in our Report.

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| CHAP. I.,
par. 15. | 1. An official record to be kept of the attendance of each officer at lectures and studies, and returns furnished to the Admiralty periodically, showing the number of absences, or partial attendances, special attention being called to the more serious cases of irregularity. |
| Par. 16. | 2. The Director of Studies to make personal visits frequently, and without notice, to the classes at work, more especially those attended by the half-pay officers, and the acting sub-lieutenants. |
| Par. 18. | 3. A subaltern instructor to be appointed under the Professor of Fortification. |
| Par. 18. | 4. The employment of one of the assistants at the Royal Observatory to take charge of the College Observatory, and teach the use of fixed instruments, with an addition to his salary. |
| Par. 19. | 5. Portions of engines of the newest type, or models thereof, to be supplied for the instruction of the students generally. |
| Par. 32. | 6. Naval instructors, after their final examination, to be provisionally appointed to assist in the instruction of the acting sub-lieutenants under the Director of Studies. |
| CHAP. II.,
par. 34. | 7. Mr. Lambert to receive 600 <i>l.</i> a year, and his title changed from Assistant Professor to Professor of Mathematics. |
| Par. 36, 37. | 8. Lectures to be delivered to all mathematical classes by the professors once or twice a week. |
| Par. 38–40. | 9. Professors and assistant professors to be appointed with due regard to the number of the students. |
| Par. 41–44. | 10. Teaching staff in mathematics, applied mechanics, chemistry, and physics to be arranged as professors, with salary of 600 <i>l.</i> a year, to be raised after five years to 700 <i>l.</i> , and assistant professors with salary of 250 <i>l.</i> , rising by 25 <i>l.</i> a year to 500 <i>l.</i> High academical or other equivalent distinction to be insisted upon in making these appointments, no one being appointed assistant professor who is over 30 years of age, nor professor who is over 40 years of age, unless by promotion in the college. |
| Par. 43. | 11. The income of the teachers to depend in some degree on the success of those whom they teach, and a sum not exceeding 5 <i>l.</i> to be granted for every officer obtaining three fourths of the maximum number of marks, such sum to be divided among the professors and assistant professors by whom the officers have been instructed. |
| Par. 45. | 12. If scheme for duties of instruction be not adopted, there is no objection to the whole of the proposals of the Director of Studies as to improvement of certain salaries; in any case, the salaries of Messrs. Haddon and Wills to be increased. |
| Par. 46. | 13. Voluntary students to be classed in their examination, at least those of the same naval rank. |
| Par. 47. | 14. No person connected with the College or with the examinations to be allowed to take part in the paid private tuition of the students. |
| CHAP. III.,
par. 53–56. | 15. Occasional lectures given by officers of the College staff not to be paid for except under special circumstances, and the fee not to exceed 3 <i>l.</i> 3 <i>s.</i> for each lecture.

In the case of lectures given by gentlemen unconnected with the College, reference to the Treasury to be unnecessary if no higher fee than 10 <i>l.</i> 10 <i>s.</i> be paid for each lecture. The total sum for these lectures, whether given by members of the College staff or by others, not to exceed 300 <i>l.</i> , the amount to be provided in the navy estimates for each year. |
| CHAP. IV.,
par. 58, 59. | 16. Examinations at the end of each session to be conducted solely by examiners not connected with the College, to be appointed for limited periods under certain conditions. |
| Par. 69, 72. | 17. Four gentlemen of good University standing, not connected with the College, to be appointed for two years to examine the acting sub-lieutenants in algebra, geometry, trigonometry, physics, mechanics, and hydrostatics. |
| Par. 70, 72. | 18. Four gentlemen, naval instructors or otherwise, to be appointed for two years, to examine the acting sub-lieutenants in steam, theory of navigation, and nautical astronomy, practical navigation, winds and currents, and marine surveying. |

19. The examiners to be enjoined to set a fair proportion of easy questions, and to seek more for a sound knowledge of a subject than for the power of solving intricate problems. Par. 74.
20. All examiners to be appointed by the Admiralty. Par. 75.
21. Subject to the appointment of examiners as proposed, Mr. Goodwin's services to be dispensed with, the duty of superintending the monthly and other examinations being entrusted to one or other of the Examiners. Par. 76.
22. The gentlemen who examine the acting sub-lieutenants to undertake the examinations of candidates for naval cadetships, of the cadets in H.M.S. "Britannia," and of junior officers afloat. Par. 85.
23. The results of the examinations of the junior officers afloat to be published to the Fleet once a year, and rewards to be given to those who most distinguish themselves in the class lists. Par. 89.
24. Director of studies to make more frequent personal visits to the several classes under instruction in the College, to the "Britannia," and to the Dockyard Schools. Par. 90.
25. Reports to be made half-yearly by each naval instructor on board ship. Par. 91.
26. Course of study in "Britannia" not to exceed that which cadets of average capacity can thoroughly understand and master. Par. 95.
27. Examinations of candidates for naval clerkships, naval instructorships, and interpreterships to be conducted by the Civil Service Commission. Par. 97.
28. Examinations at Dockyard Schools to be conducted by the examiners who undertake the examinations at the Naval College at the end of each session, to be assisted, if necessary, by two of the gentlemen who examine the acting sub-lieutenants. The instructors in the college to take part in the July examinations. Par. 105.
The professional parts of the examination relating to shipbuilding and engineering to be conducted by gentlemen connected with the Admiralty. Par. 106.
The examinations to be of a strictly progressive character during the first three years. The aggregate of the marks at the two half-yearly examinations to establish the places of the students in the July list. Par. 107.
29. The students in each year to be classed separately in the lists, giving the results of the examinations. Par. 110.
30. Additional encouragement to study to be held out to students at the dockyards, particularly the apprentices. Par. 112.
31. The general condition of Dockyard Schools, their organization, staff of teachers, and courses of study, require careful attention and consideration. Par. 113.
32. Fees to examiners for final examinations at the college at the end of each session. CHAP. V., par. 115.
33. Fees to examiners for examinations of candidates for naval cadetships, cadets in the "Britannia," junior officers afloat, acting sub-lieutenants, and Dockyard Schools. Par. 116-126.
34. Clerical establishment at Royal Naval College to be amalgamated under the supervision of a senior clerk. The services of one senior clerk to be dispensed with. The writer to be appointed a clerk of the Lower Division, with "duty" pay. CHAP. VI., par. 130-133.
35. Suggestions as to subjects of study other than purely mathematical. CHAP. VII. par. 134-145.

(Signed) OSBORNE GORDON.
H. A. MORGAN.
R. R. W. LINGEN.
J. F. D. DONNELLY.

24th March 1877.

C. D. LOVELESS,
Secretary.

List of Witnesses examined.

				Minutes of Evidence.
FANSHAWE, ADMIRAL E. G., C.B.	-	-	President of the Royal Naval College	- { 1 to 164 2077 to 2108
HIRST, DR. T. A., F.R.S.	-	-	Director of Studies, Royal Naval College	- 165 to 588
LAMBERT, CARLTON J., Esq., M.A.	-	-	Assistant Professor of Mathematics, Royal Naval College	} 589 to 723
REINOLD, A. W., Esq., M.A.	-	-	Professor of Physics, Royal Naval College	- 724 to 829
LAUGHTON, J. K., Esq., M.A., R.N.	-	-	Mathematical and Naval Instructor, &c., Royal Naval College	} 830 to 947
OBORN, T. S., Esq., R.N.	-	-	Instructor in Mathematics, Navigation, and Nautical Astronomy, Royal Naval College	} 948 to 1035 2038 to 2076
ACTING SUB-LIEUTENANT A., R.N.	-	-	Student at Royal Naval College	- 1036 to 1141
ACTING SUB-LIEUTENANT B., R.N.	-	-	Ditto	- 1142 to 1218
GOODWIN, H. B., Esq., M.A., R.N.	-	-	Assistant to Director of Studies at Royal Naval College for Examinations	} 1219 to 1346
CURME, CAPTAIN C. T., R.N.	-	-	-	- 1347 to 1463
BURNEY, LIEUTENANT S., R.N.	-	-	-	- 1464 to 1603
FAIRIE, SUB-LIEUTENANT J. C., R.N.	-	-	-	- 1604 to 1677
STEWART, MR. C. H., R.N.	-	-	Acting 2nd Class Assistant Engineer, Student at Royal Naval College	} 1678 to 1785
REAL, T. C., Esq.	-	-	Draughtsman in Department of the Con- troller of the Navy, Admiralty	} 1786 to 1853
CHEVALLIER, LIEUTENANT, R.N.	-	-	Studying at Royal Naval College for Gunnery Lieutenant	} 1854 to 1913
LIEUTENANT A., R.N.	-	-	Voluntary student at Royal Naval College	- 1919 to 1995
LIEUTENANT B., R.N.	-	-	Ditto	- 1996 to 2037

MINUTES OF EVIDENCE

TAKEN BEFORE

A COMMITTEE

APPOINTED TO INQUIRE INTO THE ESTABLISHMENT OF

THE ROYAL NAVAL COLLEGE AT GREENWICH.

At the Royal Naval College, Friday, 10th November 1876.

PRESENT :

THE REVEREND OSBORNE GORDON, B.D., IN THE CHAIR.

THE REVEREND H. A. MORGAN, M.A.

R. R. W. LINGEN, Esq., C.B.

MAJOR DONNELLY, R.E.

C. D. LOVELESS, Esq., Secretary.

Admiral EDWARD G. FANSHAWE, C.B., examined.

Admiral E. G.
Fانشawe,
C.B.

10 Nov. 1876.

1. (*Chairman.*) You are President of the Royal Naval College at Greenwich?—I am.

2. How long have you been President of it?—I have been in residence since February.

3. I suppose you are conversant with the course of instruction, and all the details connected with it, which we have to inquire into?—Yes.

4. The first question which is formally proposed to us is, "Whether, having regard to the course of study laid down for the various classes of officers, the staff of instructors is adequate and properly arranged with reference to the assistance required by the students?" We have been given to understand that we are to consider the course of study laid down as absolutely fixed, so that we are not called upon to make any recommendations relating to it, but only to consider whether the staff of instructors is adequate and properly arranged with reference to the assistance required by the students in that course of study. We should be very much obliged to you if you would give us your ideas upon that subject?—I think it is generally sufficient. There have been times when there has been a pressure arising from the number of sub-lieutenants who, as you are aware, come here to be examined for lieutenants; and their career in their profession, in fact, their actually being able to remain in it at all, depends upon their passing that examination; therefore it is exceedingly necessary that they should have a sufficient staff of instructors. The number of these sub-lieutenants is a fluctuating one, and there have been times when there have been a great number of them in the college. Upon those occasions there have temporarily been not enough instructors. The sub-lieutenants come and go; they come for six months; and some of them go every month; so that when the maximum was reached there were not enough on the staff to instruct them thoroughly. There are three persons who instruct them in the greater part of what they do, that is to say, in their mathematical instruction and navigation.

5. Last year, I think the number of acting sub-lieutenants, and acting navigating sub-lieutenants, and candidates for naval instructorships, altogether varied from 102 in February to 47 in September?—Yes. I think that number of 102 was very far above the maximum which we are likely to reach again,

but one cannot be positive. I should say that three instructors are not enough for 102 officers, many of whom are very much behind-hand when they come in the knowledge of the elementary mathematics they require to pass in. Therefore at that time the staff was short. I do not anticipate, however, that that will happen again. At this moment there are, I think, under 50; the classes are certainly very much smaller.

6. The staff is sufficient for 50, you think?—Yes, I think so.

7. But not for 100?—No, not for 100.

8. There were 103 acting sub-lieutenants examined last year and 15 acting navigating sub-lieutenants?—Yes, in the course of the year, but a portion are examined every month. I think we have had as many as 30 going up for examination, and sometimes very few; for instance, a few days ago there were only four, therefore the numbers vary very much. I think the great number last year was due to a modification of a naval order, by which facilities for coming home were accorded to acting sub-lieutenants, and then they came in great numbers. I do not think the average number is likely to be at all so great again.

9. Still you think that when the number is at its maximum the staff of instructors is not sufficient?—That is my opinion; but I think upon such an occasion, if it was represented by the authorities of the college to the Admiralty that the staff was found to be inadequate, it might be temporarily increased, because there are naval instructors who might be employed while the pressure lasted. I do not think that there is any other part where the provision for instruction is short, except one.

10. Which is that one?—That is the fortification. The Professor of Fortification is Captain Needham, of the Royal Marine Artillery.

11. Is there any deficiency of instruction as regards those students who are here for three sessions, and for two sessions?—No, I think not. I am not aware of it.

12. The number of those students appears to have been last year, 15 students in naval architecture and 32 marine engineers, including the engineer officers who are here for voluntary study?—Yes, and the foreign also.

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13. Those are nine?—No, there were one English and nine foreign. I am not in the least aware that there is any deficiency there.

14. Then there are 32 marine engineers, and 2 chief engineers, 7 engineers, and 1 first class assistant, making 57. All those students are here for three years, are they not?—No; only the naval architects and two assistant engineers selected annually. The voluntary engineer officers are liable to be called upon to serve, but their course would not be a three years course if they stayed on. These officers stay one session. If they wish it, and are getting on well, they stay a second, otherwise they go.

15. They would be dismissed or sent away, I presume?—They would be told not to return. But the students who are selected from the dockyard schools for the naval architecture course, and the two best of those who pass out of the dockyard schools as second-class assistant engineer Royal Navy, come here for three years. Their course of mathematics is a high course, and their work consists, a good deal, of mechanical drawing, which ought to be of extreme accuracy; and altogether their studies are of a high nature.

16. And you think that everything they want in the way of instruction is provided?—Yes, I think so. I am not aware that it is not so at all.

17. Are they divided into classes according as they may be in the first, second, or third year, or according to their acquirements?—They are divided into classes with regard to their years.

18. Does Dr. Hirst take a prominent part in the instruction of those students?—Not in the instruction, but in the supervision of the instruction, and of all that is done. He does not instruct himself.

19. He does not give any instruction in the college himself?—No, no instruction whatever.

20. I daresay we shall have a table before us from which we shall see what is the work of each of the professors and instructors as regards this class of men?—Yes (*handing in a tabulated statement*). If you look over the headings of that paper you will see that it gives what you want.

21. These remarks in blue are yours, are they not?—I had the paper drawn out, and afterwards I put those remarks in blue for this purpose:—there were some requests made to the Admiralty, and nearly all of them (there were only three or four) have been so far sanctioned at the Admiralty as to be referred to the Treasury in cases where there was an application for an increase of salary; and they were postponed pending this committee.

22. (*The Rev. H. A. Morgan.*) Is Professor Lambert's work of as high a character as Professor Miller's?—At this present time Professor Miller's exact point in mathematics is somewhat higher than Professor Lambert's, because the executive officers of the navy just now do not require to go quite so high, but it is not very exactly limited. It is rather expected (at least that is my expectation) that the requirements of naval officers, I mean officers who come here both for voluntary study and to prepare for gunnery officers, will become higher. From the very fact of their getting a previous rudimentary knowledge of mathematics here, as they are all expected to do now, the best of the half-pay officers will hereafter have much more knowledge to start with when they come to the higher subjects than they have now, and therefore they will be able to go higher in mathematics.

23. You think that Professor Lambert may go as high in his lectures as Professor Miller?—I think he is perfectly able to do so—in fact, I think that Professor Lambert will instruct any class of persons that can possibly be connected with the navy.

24. It appears that there has been a difference in salary of 100*l.* a year?—Yes; it is the opinion of the college authorities—an opinion expressed very strongly by my predecessor, and one which I also hold very strongly—that Professor Lambert ought to be placed

upon the same footing as Professor Miller—on the same parallel, if I may use the expression. They are perfectly separate from each other. Professor Lambert was first appointed an assistant professor; he ought to be a professor; his duties are in some degree more onerous than those of Professor Miller.

25. I suppose Professor Miller teaches the higher mathematics, including such subjects as differential equations, and so on?—I apprehend they both do that if necessary. Of course we can show you at once what Professor Lambert's classes actually do. I will show you the examination papers.

26. (*Chairman.*) You think that as regards those students who have to stay two or three years, everything that is necessary for them in the way of instruction is already supplied?—I think it is.

27. In all branches?—I think so. I daresay when you see Dr. Hirst you will ask him that question, because in consequence of his having been here all the time the system has been at work, and having been responsible for the whole of it, and having watched it carefully, he would give you a more satisfactory opinion than mine would be.

28. From his having had more experience of it?—Yes. If there had been any pressure it would have been reported to me, and I have heard nothing about it, nor have I noticed anything of the kind myself in any way.

29. In point of fact, the only persons for whom there is not sufficient provision made in the way of instruction are the acting sub-lieutenants and the acting navigating sub-lieutenants when there is an extra number of them here?—When there has been a great pressure, I have thought that there was not enough provision of that kind made, but I do not expect it to occur again. I do not at all wish to be supposed to say that I should recommend the appointment of another instructor for them permanently.

30. Is Dr. Hirst's time very much taken up with the other examinations which are referred to in your report; there are examinations for naval cadetships occurring twice a year; does he undertake them himself?—He supervises those examinations. With reference to "Britannia" examinations, he goes down to them. He has an assistant who is a naval instructor by profession, who is qualified for that sort of business, and he goes down and conducts the examination. The papers are set under the charge of Dr. Hirst, and Dr. Hirst himself goes down and conducts the *viva voce* part of the examination, but the person who is in the rooms at the time when the candidates are sitting for examination on board the "Britannia," and conducting the examination in that sense is his assistant; and Dr. Hirst borrows also the chaplain and naval instructor of the "Duke of Wellington," and, if necessary, another naval instructor.

31. Then he conducts both the examination of the candidates for the "Britannia" and the examinations twice a year there?—Yes, and also another class of examinations. Tracing on these lads, they afterwards go to sea, and they are examined every six months while they are afloat; examination papers are sent out which have come from Dr. Hirst every six months whilst they are going on with their midshipmen's duties at sea. These all tend towards their course here. Of these examinations at sea, every alternate one, that is to say, the yearly examination, Dr. Hirst elaborately reports upon to the Admiralty, exhaustively, I may say.

32. Besides that, I suppose he has under his charge the entry examinations for half-pay officers entering this college?—That examination is merely a test examination in reality to see what officers coming here on half-pay know in order that it may be seen where they are to start from. It is not in any degree an examination, the results of which are brought forward and kept for reference; it is merely a local test examination for the purpose of finding out

what each of them knows and can do when he comes.

33. (*Mr. Lingen.*) Nobody is rejected?—Nobody is rejected.

34. (*Chairman.*) I suppose those examinations do not take place at any particular time; are they held twice a year, or are they held when anybody wishes to enter?—When anybody comes, he is asked, "Just show us what you can do." It is hardly to be called an examination in the ordinary sense of the word. In fact, they do not profess to examine the higher officers, the captains and commanders.

35. Then there is a preliminary examination for naval instructors. Dr. Hirst conducts that, I suppose?—Yes.

36. There seem to have been five candidates this year?—Yes; those examinations are occasional; there are not many of them.

37. And there are examinations of candidates for interpreterships?—Yes; those are occasional.

38. There were three this year?—Yes.

39. Then there is also a half-yearly examination of junior executive officers of all classes. Dr. Hirst conducts that. That is an examination on board ship?—Yes; that is the examination I was speaking of on board ship of midshipmen and acting sub-lieutenants at sea.

40. The papers are returned here, and the results collected every July?—Yes.

41. Dr. Hirst does that, I suppose?—Yes.

42. Does he do it entirely himself or with the help of assistants?—He has one assistant, Mr. Goodwin, and now and then he asks for assistance, which has to be paid for from other sources—from the chaplain and naval instructor of the flagship. That is a point which I wanted to say I thought was a weak point at the college. Mr. Goodwin has a great deal more to do than I think he can do properly, and I doubt very much whether getting a casual man up to assist him is nearly so good an arrangement as having a permanent assistant. These occasions are so perpetually recurring that I think there should be somebody permanently under him in Dr. Hirst's office.

43. (*Mr. Lingen.*) What is Mr. Goodwin's title?—His title here is assistant to Dr. Hirst for examinations, I believe.

44. (*Chairman.*) Then there are the half-yearly examinations of the dockyard schools. Those are under Dr. Hirst's supervision, are they not?—Yes, he sends the papers down for the examinations, but he does not attend at the examinations himself. The chaplains of the dockyards go and attend in the schools and supervise them on the spot, and see that everything is done in order.

45. Do you not consider that examination as most important as determining which of the engineer students are qualified for acting as second-class assistant engineers?—Yes, it is very important; because those who are selected by that examination are those who come up to be trained to become commissioned officers—to become engineers and naval architects.

46. Out of those you select three shipwright apprentices to join the college for three years?—Yes, and two engineers; the two best are selected.

47. And then the dockyard schools have besides to be inspected by Dr. Hirst?—Yes, he inspects them; and there again he is himself of opinion that the dockyard schools should be more frequently inspected, and that if Mr. Goodwin was a little freed from the great quantity of those examination papers of all sorts that have to be looked at and carefully gone through and examined and marks given for them, he should go and inspect the schools occasionally.

48. (*Mr. Lingen.*) Is there no official inspector of dockyard schools now, such as the late Mr. Moseley and Dr. Woolley?—No; because after Dr. Hirst

was appointed here Dr. Woolley resigned, and then Dr. Hirst was requested to take upon himself, and did take upon himself, the whole of that outside business in addition to what he has to do here. It was considered both by Sir Cooper Key and himself to be extremely desirable for the naval service that it should be so, because as those schools now provide not only the highest educated naval architects but also all the engineers of the navy, and they are trained here for that purpose, it was thought extremely desirable that the director of studies at the college should be the same person who supervised the schools which supplied those higher selected officers to the college. The same thing applies also to the "Britannia." Naval officers get their education very much incidentally during those years when other people are being carefully taught in schools. Hence, there is a great advantage in having the whole system under one person from beginning to end. Accordingly, the examination papers which guide the course of instruction emanate from Dr. Hirst all through the time from the cadets first going to the "Britannia" until they come here and pass their examinations, instead of there being two or more authorities with perhaps different ways of setting examination papers, and requiring different standards, and not keeping up a continuity of instruction throughout.

49. So far then as the personal visitation of the "Britannia," or of the dockyard schools, or of any other professional school, is performed at all, it is done under Dr. Hirst's supervision?—No; Dr. Hirst himself visits the dockyard schools personally. There is no one else who is authorised at this moment to visit the dockyard schools.

50. Not Mr. Goodwin?—No; Dr. Hirst has to do it personally.

51. (*Chairman.*) Then, although Dr. Hirst does not give instruction, he has the organization of the course of instruction here, and he has all those examinations thrown upon him which we have spoken of; has he more to do than he can be expected to do; do you think that he is overworked?—I think he is.

52. And that he wants assistance?—Yes, I think so. Mr. Goodwin is his assistant, but the setting of those papers and the working out of the results involve a great amount of labour, because they are so numerous that there is hardly any cessation of it, for those examinations are continually going on. The staff is not sufficient to do it all. I should say that Dr. Hirst goes through the calculations of all the examination papers. Mr. Goodwin first of all sets the marks, and then Dr. Hirst goes through the work himself afterwards and is responsible for the marks being correctly given. Those are the marks upon which, in the case of sub-lieutenants, it depends whether they are to stay in the navy or not.

53. (*The Rev. H. A. Morgan.*) Are the examination papers all submitted to Dr. Hirst?—Yes, they all emanate from him.

54. So that if another examiner sets the papers Dr. Hirst would inspect the papers and the answers?—Yes.

55. (*Chairman.*) In our instructions there is this question raised, "whether in any, and, if so, in what cases, persons connected with the college or the Admiralty should be allowed to conduct the examinations." Now Dr. Hirst gives no instruction?—No.

56. So that really as regards the examination he may be considered as quite free from any objection, if there is any, that may be raised to the same person instructing and examining?—Yes, he is perfectly free from that objection. He supervises the setting of papers for the examination. The papers of the candidates come to him. In the case of the great examination in June, when everybody is examined except the sub-lieutenants, the examiners are outside examiners altogether, but Dr. Hirst again looks through those papers afterwards himself before he makes his report to the Admiralty. The

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examiners set the papers for these examinations, and the candidates' papers are of course sent to the examiners, and then Dr. Hirst subsequently goes through the papers again when they come back.

57. His work then is confined to the general supervision of the college and to the examinations?—Yes, including all the examinations not only of the college but of the dockyard schools and the "Britannia" examinations afloat.

58. And you think it a desirable thing that all the examinations should in that way be under the superintendence of one person?—I think it is essential to the navy that it should be so. I think that there would be a great falling off if two or three different persons took up with the education of a midshipman at different points instead of its all being conducted continuously under one person. I am supposing that it is a competent person, of course, as at present.

59. Has it ever been suggested that the examination of candidates for the "Britannia" might be placed in the hands of the Civil Service Commissioners in just the same way as the examination of candidates for Woolwich?—I do not know.

60. Do you see any objection to the Civil Service Commissioners undertaking that examination?—I do not think it signifies at all; they are boys of from 12½ to 13 years of age; they are nominees; it is a close nomination; in fact, it is entirely a test examination of little boys. I do not know whether the Civil Service Commissioners have not got plenty to do without undertaking that, but I see no reason which prevents their undertaking it at all. It is not in any shape a competitive examination now.

61. For the "Britannia"?—Yes; it is not competitive.

62. A larger number are nominated than there are vacancies to be filled, I think; is not that so?—Not now; at least they do not compete. The Admiralty have left off nominating 100 when they wanted 50, and they now nominate, I believe, exactly the number they want. They may find that they want 20, and that an average of two out of 20 are rejected, and therefore they may nominate 22, or something of that kind; but speaking generally, I do not believe they nominate any more than are necessary for the places that have to be filled.

63. I think attached to your manuscript report there were a number of printed returns of the examinations which we should like to see. The report is published, I believe?—I do not know what has become of it. I gave it in to Mr. Hunt.

64. You have not a printed copy of it?—No.

65. There were a good many details of examinations attached to it; could you give them to us?—Yes; you can get all the examination papers of all classes and descriptions. I will send for them at once.

66. Is the custom of valuing all questions in the examinations, whether difficult or easy, at about the same value, maintained still?—Certainly not; it never existed here, I think.

67. That used to be the case on board the "Britannia"; we were told that all the questions were valued at very nearly the same number of marks?—That is not by any means the case in these examinations; you will see that by the headings. If you take this examination paper (*pointing to a paper*) you will see that the number of marks given for algebra is different from the numbers given for other subjects.

68. I mean if there are 10 algebraical questions, do they all receive the same number of marks?—No; I think not.

69. (*The Rev. H. A. Morgan.*) We were told in evidence that the questions in algebra received nearly the same value, although some were far more difficult than others; for instance, if one question was marked "7" another might be marked "8," or something of that sort, but the variation in value was very small?—I believe that is not so,

but Dr. Hirst can tell you exactly, because he looks through every one of the papers and arranges the number of marks; my clear belief is that it is not so.

70. (*Chairman.*) The reason stated to us was that that system enabled boys who were obliged to obtain a certain per-centage of marks to get through; that was the case in the "Britannia"?—I should doubt whether that system exists in the "Britannia" now, or whether it exists in the college, or whether there is anything at all done with that view.

71. It is quite different from the custom that prevails in all other examinations?—Yes; Dr. Hirst will tell you for certain, but speaking very confidently, although I do not wish to speak authoritatively, I believe that the examinations here are conducted upon what are considered to be the very soundest principles. You asked me just now whether the staff was adequate, and I mentioned that Captain Needham, the Professor of Fortification, required assistance. With reference to that, I was going to explain that the probationary young marine officers used to come to the college for a session before they joined the Marines, as well as the Royal Marine artillerymen; or rather the Royal Marine artillerymen were selected from them, and they stayed a second session. That has lately been altered, and the young probationary Marines do not come up here at all; they go up for the general examination, under the Civil Service Commissioners, with the line.

72. (*Mr. Lingen.*) That is a competitive examination?—Yes, and the young marine artillerymen go up for the Woolwich competitive examination. The marine artillerymen come here for two sessions, but the Marines do not come here at all.

73. You mean that the young marine artillerymen come here compulsorily?—Yes. We had a professor and an assistant professor of fortification, and when this alteration was made the Admiralty asked the question whether it would not make sufficient difference to enable them to reduce one of those professors, so as only to have one in future. I said, I thought it would. I had no doubt that, as far as he could, the Professor would classify his men so that he could teach them all. But it is found now that those young marine artillerymen coming just from school cannot beneficially be classed with candidates for gunnery lieutenants and half-pay officers, who are much older men, have been employed in the naval service a good deal, and in such matters as field fortifications and the other subjects which Captain Needham teaches, are further advanced and require more advanced lectures and instruction generally than the young marine artillerymen; consequently, it is very difficult to teach them together; in fact the Professor cannot adequately provide for their instruction without some assistance.

74. (*Chairman.*) You are speaking of Captain Needham?—Yes. I should propose not to put another officer of rank there, but that he should be allowed a selected subaltern of Marine Artillery or Marines upon the ordinary allowance which is given to a subaltern employed as instructor in barracks; that he should come here and have only the quarters which are given to officers on half-pay, to assist Captain Needham in teaching his classes, so that he may subdivide his classes. I think that is necessary.

75. (*Mr. Lingen.*) What is about the total number of officers studying gunnery, advanced and junior?—The lieutenants qualifying for gunnery lieutenants are 19, the lieutenants on half-pay are 39; but those half-pay officers do not all attend the fortification classes. There is a certain option in the matter, the only thing that is compulsory is that they should attend the mathematical classes. It is not altogether the number that makes the difficulty. All the gunnery officers attend Captain Needham's class and require careful instruction from him.

76. Those young gentlemen who have passed at Woolwich for the Marine Artillery must attend the

fortification class?—Yes, they must attend that class, and they have to be drilled, not by the fortification officer, there is a drill sergeant, but they want the supervision of an officer over them for their drill, and also for their discipline; they are without anybody for that. Captain Needham, who is constantly occupied with his classes, and very frequently taking them out for the purpose of his teaching duties, has not time to look after the young Marine Artillery officers as they ought to be looked after, or to teach them the very elementary things they require to learn. I think that he ought to have the assistance of a subaltern; the expense would be whatever allowance it was thought proper to make to him,—it would probably be some such allowance as is given to a subaltern in barracks who is employed as instructor.

77. (*Chairman.*) I do not know whether I am right, but it appears to me that there are three classes of students here. The first consists of the naval architects, the marine engineers, chief engineers, engineers, first class assistants, lieutenants qualifying for gunnery lieutenants, and probationary lieutenants for the Royal Marine Artillery, all of whom have either a two or a three years course?—The lieutenants qualifying for gunnery have a one session course. The half-pay officers and the Engineers, R.N., voluntarily studying, are allowed to come for a second course, not necessarily, but if their attainments are good. I should not recommend any half-pay or engineer officer to be appointed again who had been here for a whole course, unless his attainments had been satisfactory, and I thought that some good would come of it. The gunnery lieutenant's course is nine months; they are voluntarily here, inasmuch as it is optional with them to volunteer for gunnery service. In that case, if they have not been to sea for a year they are sent to sea; they must have served a year at sea before they are allowed to undertake it, and then they come here for the full course of nine months.

78. (*Mr. Lingen.*) Those are naval officers, not marine officers?—Those are lieutenants in the navy.

79. (*Chairman.*) I should rather have said this; in my mind, I divide all these men into three classes; the first class are those for whom fixed and compulsory courses of study are arranged with reference to the duration of the session?—Yes.

80. The second class, in my mind, perhaps I may be wrong in the division, consists of the acting sub-lieutenants and acting navigating sub-lieutenants who come here for six months?—Yes.

81. The third class are those who come voluntarily, and who need not come unless they like?—Yes.

82. And for whom there is no fixed course of study, except mathematics?—Yes.

83. They choose what they will take out of the other subjects?—Yes.

84. But they are or may be examined in all at the end?—Yes, they are expected at the end of the session to go in for examination in all the subjects they have taken up, and you will see the programme of the examination in which all the subjects are enumerated.

85. Those three classes are kept separate as regards the courses of lectures which they attend,—they do not intermix?—Yes, they do to a certain extent. We were speaking of the test examination, to begin with, of the voluntary half-pay officers; those who are found to be sufficiently forward in the elementary mathematics would go and join the class with the gunnery lieutenants. Those who are not so forward, those who have less elementary knowledge, go into another class, which is a large class by themselves.

86. Supposing one of those voluntary students was found to be a very good mathematician, would you class him for instruction along with the chief engineers for whom a very high mathematical standard is required?—There is nothing in the rules of the college which should prevent that being done; but as a matter of fact, they actually do join Mr. Lambert's

class, and go through with the officers qualifying or gunnery lieutenants.

87-8. They are instructed by Professor Lambert?—Yes.

89. (*Mr. Lingen.*) Is the course for the acting sub-lieutenants who come here for six months compulsory upon them. I do not mean merely that they must come here, but that attendance upon certain lectures, and a certain course of study is prescribed for them?—Yes, they are under a much more stringent rule than the others in every way. They are not only upon full pay, they are younger; all their work is compulsory.

90. The voluntary choice of subjects, excluding mathematics, is confined to the half-pay officers who come voluntarily?—Yes. There are minor subjects which the gunnery officers may take or not as they like. A gunnery officer is not compelled to learn German; he may attend a German class if he likes, and if he has time for it, but I think practically their course of study under Professor Lambert is so complete, I may almost say, so severe, that it is as much as they can do, at all events, as much as those who are not very good hands can do, to keep up, and the first men among them are generally going to try for the Admiralty prizes, so that in fact it is a very hard working class.

91. (*Chairman.*) This seems a very alarming programme; it is for the acting sub-lieutenants, is it not (*showing a circular to the witness*)?—Yes, but that circular only gives the subjects; I refer to the examination papers which show the standard in each subject; and then 1,250 marks out of the 1,500 allotted to that paper gives a first class. I think there is only one instance of any one who has ever got 1,400 marks out of it. If they get 750 marks they obtain a third class, and if they do not get as many as that they are allowed six or seven weeks before going in for another examination; that is the next examination but one; it is more than a month, and it runs to nearly two months, about seven weeks. The examinations take place monthly, and they last a week. Those who do not get enough marks at one examination skip the next, and go up for the following one.

92. There are 10 papers; are they given at the rate of two a day?—Yes, the examination altogether lasts about a week. You will see the papers of the college examination here (*pointing to a paper*). I am not quite certain how many there are. These are some of the examination papers that I have just sent for for you (*handing in the same*).

93. (*Major Donnelly.*) If they fail at that second examination, what becomes of them?—If they cannot get through at that second examination they leave the navy.

94. That is final?—Yes; but very few of those who come here, however idle or backward they were before, if they set to work at the beginning and work for six months, would be unable to pass that examination if they have any intelligence at all. Generally the failures arise from their coming here knowing nothing to begin with, and in the first three months taking things very easily.

95. Are there a very large number of failures resulting in rejection?—I do not recollect the exact number, but I think about 30 have been rejected altogether since this system began four years ago.

96. (*Chairman.*) If a candidate fails in his first examination, are his marks carried on, or does he go up and start afresh with a new batch?—His marks are not carried on; he goes up with a new batch altogether. I have not quite answered your question with regard to the adequacy of the instructors, because there is another thing that I ought to mention on that head. We have at the college a small observatory which has very recently been completed and put into order. Messrs. Troughton and Simms have put it into order, but it has not yet begun to be used. It was in existence previously and belonged to the Greenwich

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Hospital school, but it has now been attached to the college, and in order to utilise that observatory there must be somebody here to teach the use of it. I have spoken to Dr. Hirst upon the subject, and his proposal is, that, associated with the staff commander, who is the instructor in nautical surveying, there should be a gentleman who has had a University education who should give instruction in the use of the stationary instruments of the observatory, and who should assist in some degree the staff commander. It is to be observed that a naval surveyor very often is not familiar with observatory work, though he knows the manipulation of the instruments for surveying, but if there is to be a course of study in connection with the observatory, it would be a great assistance to the instructor in nautical surveying if the instructor in the observatory were competent to take part in the theoretical teaching in nautical surveying, for which he would have sufficient leisure.

97. (*Mr. Lingen.*) There are three instructors in nautical astronomy and navigation; are their qualifications not such as would lead them to be conversant with this work?—No, because the instruments in the observatory are stationary instruments. It is very desirable that our officers who take up surveying should be able, in a foreign country where there is an observatory, to know something about it, and to avail themselves of it. But it is not a thing that a naval instructor, even though he may be a surveyor, necessarily knows.

98. (*The Rev. H. A. Morgan.*) It requires, in fact, a good mathematician, and at the same time one who has had experience in using those instruments?—Yes, who has had experience in that very work. It is not quite the same thing as taking ship observations, and practically the man who can do the one is not necessarily conversant with the other, because the surveying officers have perhaps never been inside an observatory. But there is the observatory, and it is desirable to utilise it.

99. (*Chairman.*) Then you think that the educational staff is deficient in three or four particulars?—I think it is sufficient except in just those points which I have mentioned. If you include the examination staff, I think Dr. Hirst has pressed upon him a quantity of detailed work which he should be relieved from by the simple process of so far improving the position of his present assistant, who is a very good and competent man, as to put some man under him and give him more responsibility, and especially give him the responsibility under Dr. Hirst of visiting the schools.

100. Then we may say, briefly, that Dr. Hirst wants an assistant?—Yes, and that the assistance he requires can be provided in the way I have mentioned.

101. And we may say also that assistance is sometimes wanted for the examination of acting sub-lieutenants and acting navigating sub-lieutenants?—Not especially as to that particular examination; and as to the instruction, I cannot say that, because I do not think it will be wanted in future. There have been times when it was wanted. It becomes a question of fairness when a man who can hardly scrape through at the best comes here, and being one of a hundred, he does not get the same amount of daily assistance in his studies as when the number is 40 or 50. But I do not think it is at all necessary that there should be another assistant for that work. I should not like to appear to say that there ought to be another permanently; if an exceptional case arose we should represent the matter to the Admiralty in order to get temporary assistance.

102. (*The Rev. H. A. Morgan.*) You can always get assistants temporarily?—I think the Admiralty could generally appoint a naval instructor. I do not know that such temporary assistance has been asked for, but I do not know why we should not ask for it. There would be a question of subsistence money, but I do not think the question will ever arise, because we are not likely to have the same pressure of numbers.

103. (*Chairman.*) In point of fact, all that you think is wanted is a duly qualified regular assistant for Dr. Hirst, and somebody to assist at the observatory?—Yes, someone to enable us to utilise the observatory. I think there should be a subaltern instructor under Captain Needham also. When the Admiralty asked me on that point, I said that I thought we did not want both a professor and an assistant professor certainly, but I do think when we try to work it, and when we see how it is working, it is evident that Captain Needham does want a subaltern instructor.

104. (*Major Donnelly.*) Professor Lambert's two assistants are, if I understand you rightly, naval instructors?—They are not Professor Lambert's. Professor Lambert has one assistant, whose name is Mr. Gleed; Professor Miller has an assistant, Mr. Pole; Professor Lambert, as I have just said, has an assistant, and Mr. Laughton, who teaches all those half-pay officers, has an assistant named Mr. Solomon.

105. They are all naval instructors, are they not?—No, those three are all of them Cambridge men.

106. Then which are the naval instructors?—I think you will find it at the end of the paper I have handed in, they are those who are teaching the sub-lieutenants. Mr. Laughton is also a naval instructor by profession.

107. Are they permanently employed here or are they only employed for a time?—They are permanently employed—their names are Mr. Oborn, the Rev. F. Davis, and Mr. Silver. I wish to mention that the examiner in physics has a certain permanent sum, because almost all the officers in the different divisions are examined in physics, and therefore instead of paying him fees, there is a fixed sum for the examiner in physics. I believe it would be found probably to be more economical, and to work better, if the examiner in French were paid in the same way because everybody is required to know some French—it is a subject of general examination. If the examiner in French, I do not mean as an individual, but the person performing that duty, whoever he was, were placed on the same footing as the examiner in physics, I think it would be an advantage—that is to say, that he should receive a fixed sum for the purpose every year instead of having a fee every time he examines. The examination in French is a general rather than a casual examination.

108. (*Mr. Lingen.*) Is there any marked difference between a professor and an instructor in the class of his duties in the college?—No, except that the professor's duties are higher of their class.

109. There are, I think, something like 30 or 31 persons engaged in instruction in the college—they are roughly divided into professors and instructors. I suppose the instructors are grouped under particular professors, are they not?—No, because their duties are distinct. Professor Miller has a distinct duty to do, exactly as Instructor Laughton has, and they are equally responsible for their duties. He has charge of his batch of students, and instructs them just as Mr. Laughton does with his batch.

110. If there is a professor and an instructor in the same branch of subjects, do they each give independent lectures?—No; for instance, each of the persons I have named has an assistant. Professor Miller has an assistant who really assists him, and is with him; so has Mr. Laughton.

111. Professor Miller is the Professor of Mathematics?—Yes.

112. (*Chairman.*) Mr. Mark Pole is his assistant?—Yes.

113. (*Mr. Lingen.*) His assistant does not lecture? I think I have put down upon the paper I have handed in the exact particulars as to that. Mr. Mark Pole gives individual instruction under the supervision of the professor, but he does not lecture. I do not mean to say that if Professor Miller was absent, for instance, he would not take his lecture, but he does not lecture generally; he assists Professor Miller. Professor Miller attends in the forenoon of every day, and his

assistant attends both in the forenoon of every day, and also in the afternoon.

114. Then might one say generally that the assistant's occupation, when he is not replacing the professor, is to give individual instruction?—Yes, to give individual instruction under the professor.

115. The object of my question was this; when we saw Mr. Hunt this morning, he said that there was a certain amount of representation on the part of the students that they had unequal advantages for study; that a certain number of them obtained private coaching, and that others who had been in ships that bore naval instructors had an advantage over those who had been in ships that bore none. I wished to have your opinion as to how far these instructors or assistants occupied the place of private tutors?—Not at all; none of them give private instruction. I do not believe that any persons have private instruction except the sub-lieutenants, and I think those remarks of Mr. Ward Hunt referred to the sub-lieutenants who are a separate set from the rest.

116. What I am asking now has a bearing chiefly upon the acting sub-lieutenants as to the sufficiency of the means provided for their instruction. If one of those gentlemen who has been at sea for six years after he left the "Britannia," and then begins to attend a professor's lectures, can get at no one except the professor who is lecturing to the whole class, he may have something to say as to the assistance which he wants and which he would be glad to get if he could. What provision exists for giving him assistance in preparing for the professor's lectures?—A great part of their time is occupied in individual instruction, and a great deal of their work is done by individual instruction in the class rooms. The instructor is there while they are working their algebra or doing their work, whatever it may be, and they can go to him if they want any assistance. The senior instructor of the sub-lieutenants does give lectures upon navigation and nautical astronomy which they attend and take notes of, but the great part of their work consists of sitting at tables, and in fact, what I should describe by the term individual instruction.

117. (*Chairman.*) Working out such problems as are given them to work?—Yes, and if they are in any difficulty they can go and ask the instructor.

118. (*Mr. Lingen.*) Then the professor does not lecture to the whole class; they are working individually in his room?—The great bulk of their work is done in that way; they do attend navigation and nautical astronomy lectures and physical lectures, and they make notes of them.

119. Between those lectures, if an acting sub-lieutenant who attended, say a physical lecture, which you say must be attended, wanted assistance in preparing for the next lecture, may he go to the professor, or is there any provision made for his getting individual instruction?—Yes, he has the assistance of the physical assistant.

120. He would give him individual assistance and explanation, would he?—Yes; he does not sit down and go through a course of permanent instruction in the forenoon under him, but if he wanted any information as to what he had seen in the lecture, he would go to the assistant, and he would give it him.

121. Supposing a physical lecture was not going on, no doubt he might go to the demonstrator's room, and the demonstrator might be good enough to give him that assistance, but would there be any provision made for him to give that assistance in the college course beyond the kindness of the demonstrator?—The instruction of sub-lieutenants, including lectures, is specially made over to the assistant in physics; if he did not give the assistance, and the officer came to me, I should see that it was done. It does not depend upon kindness at all; he is there to do it.

122. He would be bound ex officio to give him any assistance he could?—Yes.

123. (*The Rev. H. A. Morgan.*) Is the demonstrator's time limited to a certain number of hours?—Yes; all his work is limited. Taking the Professor

of Physics, for instance, there are his assistant and his demonstrator, they attend from Monday to Friday, from 10 in the morning until 5 in the afternoon; and on Saturday from 10 until 1. Those hours embrace almost the whole time during which there is study going on in the college.

124. (*Mr. Lingen.*) When you say that they attend from 10 until 5, that means that they attend in the physical department?—Yes.

125. During the whole time they are attending there, are there lectures going on, and is there also individual instruction going on at the same time?—The Professor of Physics lectures twice a week, he lectures on Tuesday in each week, and on Friday.

126. Then "attendance" means something more than lecturing, obviously he could not possibly lecture from 10 until 5?—I was speaking then of the assistant. The Professor of Physics, Professor Reinold, attends in the morning from 11 until 1 on two days of each week, on Mondays and Wednesdays from 2 till 5, on Fridays from 2 to 4.

127. That is the professor?—Yes.

128. When you speak of his attendance, does that mean that he is lecturing or that he is there to be referred to?—His lectures occupy an hour.

129. When he is there from 11 to 1 is he giving four lectures?—No, one lecture.

130. Of an hour?—Yes.

131. During the other hour he is available for individual instruction?—No, he is preparing his lecture.

132. Does your experience lead you to think that the acting sub-lieutenants who have had the advantage of a naval instructor at sea enter the college, as a rule, better prepared than those who have not had that advantage?—As a practice, I do not think it is so. I took a great deal of pains to go through the details in the cases of those who had been rejected when I first came, and I have kept up similar observations since, as far as I could, and I believe that nearly everyone who has been rejected has been in a ship with a naval instructor.

133. I think I gathered from you that every officer afloat, whether he has a naval instructor or not, has to pass two examinations a year?—Yes, that is so now, but then it is to be recollected that all these arrangements have hardly made their influence felt all through as yet. These examinations afloat have been in vogue, I believe, for about two years, and I think that the system, as it now exists, if it is left to work, will produce a continuity of education which I apprehend will do away, to a great extent, with the extreme ignorance of some of those who come here, and who, whether they have been under a naval instructor, or under no naval instructor, have been idle while at sea with reference to those studies which they pursue here.

134. When the examination papers of an acting sub-lieutenant at sea who is under a naval instructor have been sent up here and examined and marked, would any observations upon those papers which would be useful to the sub-lieutenant in the guidance of his future studies be communicated to him?—I have seen a letter from a commander-in-chief abroad asking that they might be communicated, and observing that they had not reached him for the last year; but they are not communicated from the college. Dr. Hirst draws up his report and sends it to me, and I send it to the Admiralty; and if the remarks were not communicated to the different ships afterwards, that may have arisen from an oversight. I do not know about that. My belief is that they are communicated as a matter of practice, but I have reason to believe that they were not communicated last year to one particular station for some reason or other.

135. Perhaps you think it would be an advantage to a young officer if, when his examination papers have been revised by so competent a person as Dr. Hirst, and he saw reason to make the remark upon them, "You ought to give attention to such and such a part of your studies," that remark were to reach the

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sub-lieutenant?—I think it is of extreme importance that Dr. Hirst's observations upon the examination papers should be communicated to the fleet, they would show an officer where he stands, and that not only in his own ship but throughout the whole service, and further than that, not only the officer himself but the captain and all the persons who are responsible for him would see how he has done, in comparison with other officers in other ships.

136. Has any practical difficulty come under your observation in the classification in a single college of such very various classes of officers attending for different purposes?—Not the smallest.

137. I do not mean socially, but as to the arrangement of the studies?—I think not. I think, however, that if my predecessor were here, who had to arrange it, he would have said that it had been a difficult thing to make the arrangements in the first instance. In my opinion the arrangements are well made, and there is no difficulty arising from that cause.

138. I suppose those whose attendance is compulsory here would fall mainly into two classes, those who are qualifying for gunnery lieutenants, and the engineers and naval architects require a comparatively high course?—Yes.

139. But the acting sub-lieutenants who are qualifying merely for their commissions can be put through a less advanced course; I presume that makes two main sub-divisions among the compulsory officers?—Yes; in fact it would be more correct to say three, because the engineers and the naval architects are so entirely distinct in their studies from the higher class of naval officers, that is to say, from the gunnery officers, that I do not think you can well class them together in any way. Their whole course is entirely distinct, they have nothing to do with each other. And then there is a third class, consisting of the sub-lieutenants, who are also quite distinct from the other two.

140. I thought you said in the early part of your evidence, but no doubt it must have been only as mentioning an exceptional case, that a very good mathematician amongst the gunnery lieutenants would be put into the class with the naval architects?—No, I said that there was nothing in the constitution of the college to prevent it; but I think it is in the highest degree improbable that any one of them would go, or would wish to go into that class. There is nothing that he could want to learn that Professor Lambert could not teach him. I think I may say that it is certain that no man, however good a mathematician he might be, would leave Professor Lambert on account of the extreme interest he takes in his teaching. I have asked Dr. Hirst, and he said he believed that on one occasion at an early period of the college, one officer who was a good mathematician, joined Professor Miller's class, but it was in a very early part of the system; that is the only instance in which there has ever been anything of the sort.

141. Your opinion is that the students, regarding them as a whole, have sufficient means of individual instruction from the professors and instructors?—Yes, I think so.

142. Is the examination of half-pay officers who are in attendance here compulsory?—Yes, according to the regulations of the college, every person who is here in June has to be examined. In saying that I ought to except the sub-lieutenants; I should say every person who is going through the sessional course has to be examined in June. Half-pay officers come and go. A lieutenant particularly is liable to be appointed to a ship at any time; in fact the Admiralty has very wisely, as I think, said that those who come to the college to study when they are on half pay have the preference; so that those officers are always coming and going. That sessional examination in June would be useless in the case of a lieutenant who perhaps has only come here six weeks before; one would not make it necessary for him to go through an examination which would prove nothing.

143. One of those officers might be at liberty to attend classes here for five months, and not being very well satisfied with his own progress, he might then leave, declining the examination?—Then I should report to the Admiralty that he had done so. I do not think that it would carry any penal consequences with it, because half-pay officers have a freedom which could not be infringed upon very much without preventing their coming here, and the object is that they should come,

144. (*Chairman.*) I see that 117 altogether seem to have been here last year according to your report. There were four captains, four commanders, 93 lieutenants in the Royal Navy, eight navigating-lieutenants, one captain in the Royal Marine Artillery, one lieutenant in the Royal Marine Artillery, one captain in the Royal Marine Light Infantry, and five lieutenants in the Royal Marine Light Infantry?—If any half-pay officer is found not to work reasonably he is told to go. I advise him to go, and if he did not go I should make a report to the Admiralty. But that only happens very seldom, because it is found generally that if a man is not taking up one subject he is taking up another.

145. Out of that number of 117, only 37 attended the whole course, 56 were examined, and 26 obtained honorary certificates?—Yes. With regard to those honorary certificates given to half-pay officers I would say that I sign them, and I think it is very striking in looking at them to see the amount of information disseminated in the navy which did not exist previously, and which is likely to be the parent of a good deal more information in the case of most of them, that is, information which they would not otherwise have acquired while on half pay.

146. (*Mr. Lingen.*) Were those certificates given on their examination?—Yes; they all wish to get the letter "G" put to their names in the Navy List; which implies that they have got one of those certificates. They desire to get the letter "G," because, although it does not bring them any direct advantage, it is a creditable thing to them, and it tells in their favour; they all wish to get it, but some do not get it; it depends upon the examination.

147. (*The Rev. H. A. Morgan.*) Is it possible for backward students to obtain extra instruction, in the way of private tuition, by paying for it?—Yes. As far as I know it is confined to the sub-lieutenants, but there are tutors in the neighbourhood here who give such instruction, and a great number of those who feel themselves backward go after study hours, and get lessons with a private tutor; a considerable number of the sub-lieutenants do that.

148. (*Mr. Lingen.*) That puts a man who has no private means at some disadvantage, does it not?—It is a very great advantage to the navy if a man who is ignorant gets instruction in that way. Speaking as a naval officer, if I am captain of an ironclad, and I am obliged to have an officer under me who is ignorant of his profession, and who is unable to pay a man to teach him what he ought to know, that is certainly a disadvantage to me. The payment made by a naval officer for education is a very small thing compared with what is paid for the education necessary for any other profession, even if he has to supplement the teaching he gets at the public expense.

149. (*The Rev. H. A. Morgan.*) If a man is very backward it is absolutely necessary that he should have private instruction in some of these subjects, is it not?—Yes; I think so, if his abilities are mediocre.

150. (*Chairman.*) The algebra, geometry, and trigonometry that he requires to know in order to pass do not seem to be anything more than he was supposed to have known when he left the "Britannia"?—Very little more.

151. We may perhaps assume that he has forgotten some of his knowledge in the meanwhile?—Yes; but, as I before stated, he has, whilst a midshipman, to work papers from the college every six months, all leading up to his final examination; and I may mention that all the examination papers of sub-lieutenants

passing at the college for lieutenants are distributed to the fleet for the information of the midshipmen and their instructors. What will suffice to carry him through his college examination is a very elementary knowledge. You will see that there are 200 marks given for practical navigation.

152. There are 400 for navigation and nautical astronomy; of course he must know something of that?—Yes; but that 400 is divided into 200 for nautical astronomy, and 200 for practical navigation, which is a thing that every mate in the merchant service is supposed to know. These are commissioned officers in the navy, and they may be set to do lieutenant's duty, and if they cannot get good numbers in that subject that implies that they cannot navigate a ship.

153. (*Mr. Lingen.*) Failures after a certain time oblige an officer to retire from his profession?—Yes.

154. What would be your opinion upon this; supposing there was a minimum standard for admission here, and then within the college there was such provision for private instruction without further charge that no man who had passed the entrance examination, and who had ordinary diligence, should have any difficulty in passing the final examination?—My opinion would be that a midshipman in the navy would have to pay a great deal more in order to pass the entrance examination here, though you put it as low as you could with any decency, than he needs to pay now for any private tuition. Officers in the navy who have been holding the rank of acting sub-lieutenant would have to pay more to prepare for admission under that system than they have to pay if they come here and give due diligence for the whole six months they are here; and it would assume the form of cramming, which is not the case now.

155. You are not in favour then of a rejecting admission examination?—Not at present. I think it would tell very hardly upon the officers.

156. More hardly than a rejecting examination at the end of six months?—Yes, because I know, as far as I can tell from analysing each individual case, that it has very rarely indeed happened that any one has been so backward and at the same time so dull that he could not pass the minimum here if he worked all through from the beginning of the six months that he was here.

157. (*Major Donnelly.*) How do the officers manage who happen to be on board ships that have no naval instructors; do they get any assistance in carrying on these studies?—Yes; because according to the Admiralty regulations if there is no naval instructor another officer can teach them; it generally is the navigating officer, and then he receives the tuition money; and inasmuch as the requirements are not high, and in such cases the number seldom exceeds four, almost any navigating officer can teach them. In geometry, for instance, the first six books of Euclid is the highest point; the examiners do not set anything above that. Besides that they have the opportunity of getting up the real practical navigation better or quite as well as they would with a naval instructor. They can get on with some of the subjects just as well without a naval instructor as with one. Speaking generally they can easily be taught the very elementary

amount of Euclid and algebra that is required, bearing in mind what they know when they come from the "Britannia," because the examination does not go much further than quadratic equations in Algebra. I may add that the number of ships with midshipmen and without naval instructors is few. The November Navy List shows 7 ships with an aggregate of 19 midshipmen.

158. Does not the fact of their entering the college every month make it very difficult to arrange the classes for instruction efficiently?—I think not. The junior instructor takes them for the first two months, and when those two months are up they pass on to the second instructor, and they go to the senior instructor for the last two months.

159. Of course, in the case of mathematical instruction, which is a class of individual instruction, it might be very easy; but I was referring more to such matters as courses of physics, where there are lectures?—I think the courses of physics are very slight indeed.

160. Take chemistry or any subject in which there are lectures?—They are not examined in chemistry.

161. Are you speaking of those officers who may join in any month?—Yes, the sub-lieutenants; they are quite in a different position from any others.

162. In the case of a professor who has an assistant, does the assistant act absolutely as the assistant of the professor, that is to say, does he give such instruction as the professor directs him to give, or is it simply that there is a division of the class as it were into two parts, the professor taking one half and the assistant the other?—The assistant takes a part of them.

163. He is not, as it were, a demonstrator to the professor, but they divide the class between them?—Yes.

164. At what period do the half-pay officers join; is it at any time or at definite periods?—They join generally at the beginning of a session, but the lieutenants come and go, because when they are paid off from a ship they may wish to come to the college at once. If they could not come till the next October they might not come at all; they might be employed again in the meanwhile, and when they are told that it will be some advantage to them if they do come, it would not be quite fair to them not to give them an opportunity of coming when they have been paid off, and when they can come. It is not quite the same with the commanders and captains. The one or two captains who are here came at the beginning of October, and the commanders too. I think there are seven commanders, and one or two of them came at the end of last session; one of them was promoted, and came immediately after he was promoted; that was towards the end of last session, and he has come again for the next session. By referring to the papers before you you will see that the sub-lieutenants do not get any marks at all for chemistry. The paper which I have handed in is a Table of the Examinations showing by whom they are conducted. I think something of the same kind has been drawn up once before when the Treasury wished to have it.

The witness withdrew.

Dr. T. ARCHER HIRST, F.R.S., examined.

165. (*Chairman.*) Your title here is Director of Studies, is it not?—Yes.

166. And you have the arrangement of the whole studies of the college, I suppose, at your discretion?—Yes; the whole of the studies of the college, and the internal and external examinations also are under my direction.

167. But you give no direct instruction to anyone?—I give no instruction, if I except filling a gap occasionally.

168. It is not part of your duty to give instruction, but only to supervise the instruction which others give, and the examinations?—No; sometimes an instructor or a professor is unable to attend, and I then take his place if I can.

169. Do you know what are the questions which we have to inquire into? have you seen our instructions?—Yes.

170. The first is, "Whether, having regard to the course of study laid down for the various classes of

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"officers, the staff of instructors is adequate and properly arranged with reference to the assistance required by the students." Some of us have had an interview with the First Lord of the Admiralty this morning, and he told us, in answer to our inquiries, that we were to consider that the course of studies laid down was absolutely fixed; so that we have nothing to do with that except to make ourselves acquainted with what it is; we have no recommendations to make upon it. We confine ourselves entirely to the subjects placed before us, the first of which is what I have just stated. It seems to me that the students here might conveniently be divided into three classes. The first class would comprise those who are bound to a two or a three year course, and for whom a fixed and compulsory course of study, arranged with reference to the duration of the session, has been established. The second class consists of the acting sub-lieutenants and acting navigating-sub-lieutenants who have to go through a six months' course here; and the third class, those who come here for voluntary study. Is that a correct division of the students in this college?—It is concise, and on the whole correct. I divide them generally into two classes,—the voluntary students, and those who are following prescribed courses of study. That division is a little more general than yours, but it is virtually the same.

171. I think it would be well to know accurately who are the students who are bound to a three years course. As far as I gather from the last Report they are in the first place the naval architects, are they not?—Yes; their course occupies three years.

172. And the marine engineers, including the English and foreign officers for voluntary study, are they bound for a three years course?—Their complete course is a three years course. From the students of marine engineering, two are selected every year to undergo two more years instruction, in addition to the one already received.

173. (*Mr. Lingen.*) One in the dockyard schools?—No one here, they all come here from the dockyards for one session.

174. (*Chairman.*) Two chief engineers?—No, they are acting second class assistant engineers. I may add that all engineer students in our dockyards, after an education of six years there, come and pass one session here; they all do that without exception, unless they fail to pass the final dockyard examination.

175. (*Mr. Lingen.*) It is not competitive for the first year, but every dockyard apprentice, if he is going on in the public service in the dockyards, comes here for a year?—I must ask you to distinguish between two classes of students from the dockyards; as also there are engineer students in the dockyards, and there are more strictly dockyard shipwright apprentices; these are very different men. The engineer students all come here as a matter of course at the end of their six years study in the dockyards, unless they should prove to be unqualified, in which case they would be sent back for one year to the dockyards, after which they would be rejected altogether from the service unless they came up to the standard; but as a general rule all come here after six years study and work in the dockyards. This applies to the engineer students. It is not so with the shipwright apprentices; for them there is a competitive examination, and only three come here yearly, these being chosen from all the dockyards. The selected three come here for three sessions.

176. May I ask, only for the sake of information, is a lad apprenticed in the dockyards either as an engineer apprentice or as a shipwright apprentice, those being different careers in the dockyards?—A shipwright is apprenticed; engineer students are not properly speaking apprenticed; they ultimately belong to the navy, whereas the shipwrights never belong to the navy, they come under a different category. The engineer students may gradually rise in the service to be chief engineers.

177. Then an engineer student is a person who has been grown on board ship and not in a dockyard, is that so?—No, he begins his course in a dockyard and he goes to sea afterwards.

178. And then comes here?—He comes here before he goes on board ship; he occasionally goes on trials of steam machinery and so forth when at the dockyards, but he does not go regularly to sea until after he has been here.

179. This one session's course here follows his six years course in a dockyard?—Yes; the engineer students after their six years training in the dockyards become, on passing the final examination there, acting second class assistant engineers, and come here as such for one session at the end of that training. From them afterwards we select two, and only two, who are to remain for a second, and afterwards for a third session; three sessions being the duration of the complete course necessary to enable an engineer to obtain what he calls his professional certificate. The dockyard apprentices, three of whom are chosen at the beginning by competitive examination, come here, knowing from the first that they will stop three years and complete their course; in the end they endeavour to take a professional certificate in naval architecture. I may add that, with the exception of the selected two, the acting second class assistant engineers leave us after one session; we see no more of them until they become either first class assistant engineers, or engineers, or chief engineers, when they come as voluntary students.

180. (*Chairman.*) I think it would be useful to us if you would have the kindness to put on paper the number of persons who have been, we will say in the last year, going through the three years course?—It is scarcely necessary to put it on paper, since as we may always count upon the return to the college of two acting second class assistant engineers, we have necessarily at any one time six, that is three times two, who are undergoing their complete course. Of the shipwright apprentices, we have necessarily nine studying at the college at any given time, because three are admitted annually, and they remain three years. Exclusive of English and foreign private students, therefore, we have always fifteen going through a three years course of study.

181. The complete course?—Yes.

182. Is their instruction carried on separately from the instruction of those who are going through a shorter course, or are they combined together in classes?—In their first year they are all together.

183. Both those who are in for three years and those who are in for one?—Yes; they all study pure and applied mathematics together during the first session. They are divided, it is true, into two divisions, but of that I will speak afterwards; that is a minor point. The first-year students all study together. After that a selection is made of the two engineers who remain, and they, with the three naval architects who necessarily remain, go into another class. They study during their second year in the same class, but in a lower division of it, with those who are in their third year. In short, the second and third year's men study in the same room, although they constitute different divisions of the class; the first year's men constitute two divisions of a lower class, each division occupying a separate room.

184. (*Mr. Lingen.*) Whether they are engineers or shipwrights?—Yes, they have a common course in mathematics and applied mechanics for the first year.

185. (*Chairman.*) We find that there were fifteen last year going through a three years course. How many were there going through a two years course?—There is no two years course either in marine engineering or in naval architecture.

186. How many were going through the one years' course?—About 40; including the voluntary student of marine engineering before alluded to.

187. (*Mr. Lingen.*) The number of first, second, and third year's men is always equal?—Yes; if we

confine ourselves to those who are going through the complete course.

188. But there is an accidental number also of those who come up for the one year only?—Yes; their number varies from year to year.

189. So far as that goes the men in the first year's course may be, and are, more numerous than those in the second and third year's course?—Yes, they are always more numerous.

190. (*The Rev. H. A. Morgan.*) Is the selection made by competitive examinations after they have been here for a year?—It depends upon the examination that they pass at the end of their first session. Those who come out first are selected; it is competitive in that way. The two students of marine engineering who have most distinguished themselves remain for a second and a third year. If they remain for a second year they remain necessarily for a third, unless their progress has been unsatisfactory, which case has never arisen.

191. How many have you in the first year's course?—The present number is perhaps slightly under 40, but you will have the actual numbers given you afterwards if you please.

192. (*Chairman.*) We may take it that there are about 40 in the first year, but that the number in the second is much smaller?—Very much; exclusive of the private students (chiefly foreigners) only five; three of naval architecture and two of marine engineering were selected to remain a second year.

193. (*Mr. Lingen.*) When you say you select the naval architects, they are selected for the three years course, and when we come to the second year's men, they are only those naval architects who have emerged from the first year's course?—Exactly. The shipwright apprentices are differently treated from the engineer students. As I said, only three shipwright apprentices come yearly, whereas on the average 40 acting second class assistant engineers come.

194. The shipwright apprentices represent really the highest intellect of the constructive department of the navy?—Yes. The three selected shipwright apprentices are the cleverest of their year in all the dockyards.

195. (*The Rev. H. A. Morgan.*) What becomes of them when they are rejected, supposing they are persons of any merit?—Those who are not successful in the competition for entry to this college either find employment in the dockyards or in private yards. I believe we have had no rejections at the final examination. All those who have studied here have obtained at least third class professional certificates in naval architecture.

196. (*Mr. Lingen.*) Then for these students who are going through the course as shipwright apprentices or as engineer students, you have a rejecting examination for admission?—Yes, you may say so.

197. The shipwrights come in by competition?—Yes.

198. For the others you have a test examination, which if they do not pass, you do not admit them?—We have; and besides this, a selecting examination for those who are to remain more than one session.

199. (*Chairman.*) And those are 15 in number?—There are always 15 students in the college who are going through the complete course, either of marine engineering or in naval architecture. To these we must add the private students, consisting at present of two Italians, two Russians, one Dane, and one Swede.

200. Then we may consider those students who are obliged to go through a specified course of instruction for one or three years as separate from the other students in the college?—It would be better to do so.

201. As regards that particular class, do you think that the staff of instructors is adequate and properly arranged with reference to the assistance required by the students?—Yes. You are speaking solely now of the students of naval architecture and marine engineering.

202. Yes; I am speaking of all those who stay here for either one or three sessions. I should like to know your opinion as to whether the staff of instructors for

them is adequate and properly arranged, with reference to the assistance they require in their studies?—I decidedly think it is.

203. You think that nothing is wanting there?—Not for them. I will speak of the others afterwards. They are now working extremely well, and I do not know of any shortcomings whatever of a permanent character in the staff.

204. (*Mr. Lingen.*) Is it necessary to consider together with them any of the half-pay officers who come here by their own choice, and who are well qualified to come here, and who want to take full advantage of all the benefits which the college offers to them; do you at all include them in what you have said as to the adequacy of the staff?—No; I confine myself entirely, at present, to the students of naval architecture and marine engineering.

205. (*Chairman.*) You think that nothing is wanting with a view to their complete instruction?—No; they are very well provided for now. Do not let my words be misunderstood. I shall have occasion under another head of your instructions to say a word or two as to an improvement which would affect them as well as others, namely, as to increased facilities for hearing occasional lectures on special subjects; but confining myself to the permanent staff of the college, I consider that the students now under consideration are well provided for.

206. You think that no better arrangement could be made for their instruction, and that the staff is adequate for the purpose?—The staff is adequate, and I consider the arrangements very satisfactory.

207. I suppose you made the arrangements?—In conjunction with Admiral Sir Cooper Key and with the individual instructors in the more technical subjects.

208. Are the men in this class divided for purposes of instruction according to their acquirements or according to their age. I mean as to their being in their first, second, or third year. If, for instance, you had in his first year a very good and advanced mathematician, should you promote him to be instructed along with those of the third year, or should you keep him amongst his fellows of the first year?—We keep him among the first year's men. Of those first year's men we have two divisions; the one contains the shipwright apprentices and the ablest of the students of marine engineering; the other those who are least able, and also the voluntary engineers, who generally join the lower division since they have not previously had opportunities for pursuing mathematical studies.

209. You would take the volunteer engineers into that class?—Yes; they are usually taken into the second division of the class.

210. This class includes the foreigners, does it not?—Yes, it includes foreigners also. We could not put any first-year student in a higher class than this, because we commence with our highest division of the first year's men at the point which they have reached in their dockyard studies; not having gone further than this, their joining any other class at the college is out of the question. We are compelled to make a lower division of those who have not been very diligent at the dockyards, but have just been able to pass the examination, and that division includes also those voluntary students (who are older men) who have had few opportunities for studying mathematics. They join the lower division, with engineer students of lower rank than themselves, because their advantages have been less.

211. Then as regards the first question we have to consider, so far as it affects that class which I suppose you would consider the *élite* class in respect of advanced education in this college, you think that the staff is sufficient, and that no further assistance is required than they get?—I do.

212. Now I will take the second class, that of acting sub-lieutenants and acting-navigating sub-lieutenants, do you think that there is adequate means provided for their instruction?—At the present

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moment, yes; but they have diminished in number. There was a time, a year ago, when their numbers rose to upwards of 100.

213. They were 102 in February of last year, I see?—That was so.

214. And 47 in September. I do not know whether that means September of last year, or of this year?—Probably this September. They have diminished considerably in number. Our present number is 53, and for them our present staff is quite sufficient, but I cannot say how long it will remain so and whether the number will rise to anything like the same point again; I think it will not, so far as I can hear, ever rise to 100 again; but if it were to increase to, I will say 80, I should be very glad to see our mathematical staff a little supplemented.

215. In that case you would wish the mathematical staff to be strengthened?—Yes. I look upon 25 as the maximum number that an instructor can well teach. I do not speak of his lecturing or black-board work; he can teach 50, as far as that goes; but to attend to them individually, I consider 25 as the maximum that he ought to have. Now we have three instructors for that class; three times 25 would give us 75; therefore our present staff would suffice up to 75; but if we had more than that, I should like to have additional strength for instruction.

216. I suppose you would say that mathematics was a subject which required more individual attention on the part of the instructor than any other subject, because, if a youth is stopped at a particular point in a mathematical problem, all the rest of the time is wasted?—Yes.

217. He must be put right exactly at that moment?—Yes. The only way to teach mathematics properly in a college such as this, is first of all to have a thoroughly clear exposition given to all, or to as many as are able to follow it, on the black board, and then as soon as that is over to let the students go immediately to their seats for the purpose of considering the problems suggested in the lecture, and of working at them individually under the supervision of the lecturer and his assistants, so that any difficulties which may present themselves may be overcome.

218. At the moment?—Yes, at the moment. You should strike while the iron is hot; that is the only way to keep the class well together, and to render the instruction permanent.

219. Then as regards this class of students, namely, the acting sub-lieutenants, and the acting navigating-sub-lieutenants, you think, on the supposition that their numbers will not exceed 75, that no further assistance is wanted for teaching mathematics?—No, not as regards mathematics.

220. Nor in other subjects?—No, I cannot say at this moment that any other subject occurs to me in which more assistance is required.

221. I have before me the subjects in which these acting sub-lieutenants are to be examined, they are very numerous, and occupy a great deal of space on the page, but in fact in many of them what is required does not seem to be anything more than what they did when they passed out of the "Britannia"?—Very little more.

222. I have here a document that was published, I think on the motion of Lord Chelmsford, containing the final examination for the cadets on board the "Britannia" in the year 1874. Should you say that on the whole the papers that are set to the acting sub-lieutenants are more difficult than those?—They might be a little more difficult in the way of riders, and that kind of thing; but it is substantially the same ground that is covered.

223. That (*handing a paper to the witness*) is a final examination paper on board the "Britannia," it was set under the sanction of Dr. Woolley?—The algebra paper is virtually the same, the difference is not worth speaking of. The geometry is the same. The trigonometry, the practical part of it at all events, is precisely the same. In spherical trigonometry there is no difference in character. In practical navigation,

there is the sheet which has been in existence for a long time, what is called the "college sheet." In chart drawing it is the same. In physics, I should say, it is slightly simpler, if anything, now than it was then. Those papers on physics appear to include, partly, what we should now call steam. The sub-lieutenants are not examined in geography or history. On the whole I should say that the present examination is almost, if not quite, as simple as the one indicated by that paper.

224. This was passed by boys of from 14 to 15 years of age?—Yes.

225. (*Mr. Lingen.*) Do you see the papers of the cadets who have passed that examination; are they sent to you?—That particular examination no longer exists.

226. I mean the examination on board the "Britannia"?—There is an examination on board the "Britannia," but this is the old "Britannia" examination.

227. (*Chairman.*) That was the examination in 1873?—Yes, that was before my time.

228. (*The Rev. H. A. Morgan.*) Has there been much change made in the "Britannia" examination?—Yes, it is simpler now than it appears to have been then.

229. (*Chairman.*) The point I wished to arrive at was this; this examination for acting sub-lieutenants here is very little more difficult than the examination that was set as the final examination of the boys on board the "Britannia" in 1873?—Very little more. In practical navigation and nautical astronomy the questions are, perhaps, of a little higher character now.

230. So that this examination, although it looks alarming, when you consider the number of subjects, is not really such a formidable thing?—No.

231. The course of instruction is quite adequate to meet the wants of the students, supposing they are not more than 75 in number?—Certainly. I may add, with reference to the last question, that it should be borne in mind also that after leaving the "Britannia," midshipmen pass, while afloat, a yearly or half-yearly examination, so that they may not forget what they have learnt, but may keep in view the examination they will have to pass here. Of course during the transition period, when this college was first established, it was found that many sub-lieutenants who had been on ships where there was no instructor had forgotten a great deal that they had learnt, and therefore our examination came upon them rather hardly at first. Many, too, had lost the habit of study, which is more important still, and they failed in greater numbers; but the matter is getting into a state of equilibrium now.

232. (*The Rev. H. A. Morgan.*) Do you suppose that any of those acting sub-lieutenants have recourse to private tuition?—Unquestionably they have.

233. That is to say, tuition for which they pay themselves?—Yes, I speak to them frequently on that point. Private tuition is sought only, or rather chiefly, by those who have neglected their studies during the earlier months; the first two or three months of the six are very important ones.

234. You consider that if they had not neglected their studies in those two or three months, private tuition would not be necessary?—I do. Except in very rare cases, I advise them to dispense with private tuition. I believe that the instruction they receive in this college, if they would only attend to it, is far better for them than the cramming they get outside.

235. Who are the private tutors from whom they receive aid?—I do not know them individually.

236. They do not receive aid from the actual instructors in the college?—They do not, to my knowledge, pay for any such aid.

237. (*Chairman.*) I suppose if the method of instruction here was as perfect as it is possible to conceive, and the staff perfectly adequate for it, that would not hinder some men from having private tutors; they would have them under any circumstances?—Certainly they would. Many would con-

sider that a private tutor, whom they paid, was of more service to them than one who was provided for them.

238. In fact I have sometimes noticed at Oxford that men consider that the college tutors are their masters, whereas the private tutors whom they pay for are, in their opinion, servants, and a man likes to have a servant?—Yes, the habit of employing private tutors—coaches, as they are called here—is to be discouraged; it is not necessary to have recourse to them.

239. (*Mr. Lingen.*) Your own clear opinion is that a diligent and prudent student who makes the most of his means, without being a very great genius, would find within the college everything which is necessary to his passing the final examination?—Unquestionably. That has been proved over and over again.

240. (*The Rev. H. A. Morgan.*) What opportunities have such students of gaining information from the instructor independently of the actual lectures?—As I have said, his normal class should consist of 25. His instruction is given partly on the blackboard and partly at their desks, where they try to solve their individual problems; in cases of difficulty, they are promptly assisted by their instructor.

241. How long would such a lecture last? I ask this because one knows how difficult it is to explain the difficulties of every student in a large class in the time usually given to a lecture. Each has a difficulty of his own?—The time varies very much; it is chiefly the book-work that is given on the blackboard, together with additional illustrations; the officers then work their problems, and if they meet with difficulties in doing so they go promptly up to the instructor, and get assistance. If he has only 25 students in his class he can attend to all their wants.

242. For how long a time are those 25 together?—On the average for three hours in the morning, and two in the afternoon.

243. (*Chairman.*) I suppose what the instructor would do would be this: he would work out the formula for arithmetical progression for instance; that would be on the blackboard, and then he would give them examples and questions, which they would work out, having that formula before them, and getting up the process by which the formula was arrived at?—Exactly so.

244. (*The Rev. H. A. Morgan.*) In fact he is only lecturing for a short part of the time?—A very short part of the time.

245. A third or a fourth part of the time probably, and during the rest of the time he is working for them as a private tutor?—Yes, that is the practical part of the instruction. But he does not give lectures so much as blackboard instruction, and that only when he has a number of students equally advanced, so that an explanation which he would give to one will suffice for all; in this he is guided by the progress of the pupils.

246. He is like a private tutor with 25 pupils?—Yes. I shall have to speak of nautical astronomy and navigation presently; there it is a little different. In this subject formal lectures are attended by the sub-lieutenants; the course consists of 30 lectures, given by Mr. Oborn, and the subject is gone through in a methodical manner just as in our best lectures. Those lectures last for an hour; after each, the officers retire from the lecture room and sit down for three, and sometimes for four hours a day, working examples connected with the lecture under the supervision of the lecturer. He attends to their individual wants during that time, but in the lecture he gives a systematic exposition of the subject; these lectures are attended by many of our voluntary students.

247. (*Chairman.*) Now we will come to the class of voluntary students who have no prescribed course to follow, except mathematics?—Before doing so, may I mention one class of non-voluntary students which you have not yet alluded to—I mean the probationary lieutenants of the Royal Marine Artillery,

eight or ten in number. Their means of instruction I can scarcely consider to be adequate at present. I should much like to see a slight increase of staff here. Captain Needham has charge of their military history, surveying, and fortification, as well as of the instruction of other officers in these subjects. He has no assistance whatever. Formerly we had both a professor and an assistant. Captain Needham now does all the work. He gets through what he has to do certainly, but it is only by paying less individual attention to his students than I should like to see.

248. Those are non-voluntary students?—Yes.

249. How long have they to stay here?—For two years. They pass the same examination on entry as those who pass into the Military Academy at Woolwich. The examination is conducted by the Civil Service Commissioners, and a certain number of the successful candidates come here as probationary lieutenants in the Royal Marine Artillery. Eight or ten are admitted; there might be more if the service required it. Their normal period here is two sessions. The regulations have just been very much altered, and therefore I must speak of the future rather than of the past. At present they come as probationary lieutenants; at the end of their first session they are to undergo an examination, and if they pass it satisfactorily they are to be allowed to remain for a second session.

250. Does that apply to all of them or only to a certain number?—In future all may remain, I believe, formerly it was different. I do not yet know what will happen should they not pass a sufficiently satisfactory examination at the end of the first session. Formerly provision was made for their passing into the Light Infantry, but this may not be the case in future. These probationary lieutenants of the Royal Marine Artillery greatly increase our work at the college.

251. (*Mr. Lingen.*) Do they go through the same course as the naval lieutenants who are qualifying for gunnery?—In their second session they do. In their first session we are forced to give them instruction apart. They are younger even than our sub-lieutenants, and much younger than our voluntary students; hence they cannot well be taught in the same class with the latter, although they may be studying the same subjects it is true. In their second session a different kind of discipline is possible, for the most part they become steadier, are ambitious to join our best classes, and work in them very well. I may say that in their second session they give us no extra trouble; but in their first session we have to make special provisions for them.

252. (*Chairman.*) Then you think that Captain Needham wants further assistance?—I do.

253. Now we may go on to the third class of voluntary students who come here of their own will for study and improvement?—I think you have not yet referred explicitly to the gunnery lieutenants; they are not voluntary students.

254. In my own mind I included them in the class of compulsory students?—Yes, but they are of a very much higher class than the officers of whom we have been speaking.

255. (*Mr. Lingen.*) They also are compulsory?—Yes.

256. Whether for the marines or for the naval service the gunnery course is compulsory?—The gunnery course is for the navy only. We do not term it a gunnery course for the Royal Marine Artillery; the gunnery course is quite distinct. These officers constitute our highest class of obligatory students. They may be said to be to the navy what the Royal Engineers are to the army; they are picked and selected men. After going to sea for one year specially, they come to us for one session only, and they have to study mathematics up to a comparatively high point.

257. They study mathematics under Professor Lambert?—Yes, under Professor Lambert.

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258. And Mr. J. Henry and Mr. Glead?—Under Professor Lambert and Mr. Glead. Mr. Henry has now gone; they also study fortification under Captain Needham, and physics under Professor Reinold.

259. There are 18 of them, are there not?—Yes; they take those three subjects, mathematics, fortification, both field and permanent, and physics, with introductory lectures on chemistry, but we class it all as physics; their course is a very thorough one. I may mention in passing that of all the students I have known (in colleges or universities) I consider them to be the best; the most satisfactory, and the hardest workers.

260. (*Mr. Lingen.*) You said that those were picked men; if they are picked how is it a compulsory course?—I used the expression “picked men” in a non-conventional sense. A gunnery lieutenant is regarded as a lieutenant who has gone through a higher course of instruction.

261. Must every lieutenant come to the college for gunnery instruction?—No.

262. (*The Rev. H. A. Morgan.*) Where do they come from?—From the navy, from the ranks of the lieutenants; it is at their own option that they come; they apply to the Admiralty and express their wish to go in for gunnery; thereupon they are usually sent to sea for a year, and then they come here; afterwards they are sent to Portsmouth for a course of gunnery and torpedo work.

263. Are they admitted by competitive examination?—No, it is upon their own application.

264. (*Chairman.*) I suppose their proper title is not gunnery lieutenants but lieutenants qualifying for gunnery?—That is the better and more accurate title. For shortness we say gunnery lieutenants.

265. (*The Rev. H. A. Morgan.*) Do you consider that the staff of instructors is adequate and properly arranged for them?—Yes, with the single exception which I mentioned before, that of Captain Needham who requires assistance.

266. (*Chairman.*) Now we will go on to the third class, consisting of those who come here for voluntary study, of whom there seem to have been in the course of last year as many as 117 altogether; viz., four captains, four commanders, 93 lieutenants in the Royal Navy, eight navigating lieutenants, one captain in the Royal Marine Artillery, one lieutenant in the Royal Marine Artillery, one captain in the Royal Marine Light Infantry, and five lieutenants in the Royal Marine Light Infantry?—Yes.

267. (*Mr. Lingen.*) Did not those 93 lieutenants include those who had come to qualify for gunnery?—No.

268. (*Chairman.*) Is the staff of instructors sufficient for this large class of 117?—Those numbers have diminished considerably; we have not that number now; that was last year.

269. That number will be found in the paper we have just had laid before us. I see that out of those 117, 37 attended the whole course, and 56 were examined. Is the staff of instructors sufficient for them?—At the present moment the staff is sufficient, with one or two slight exceptions: One is the case of Captain Needham, already referred to, the other I shall mention presently.

270. They are all obliged to study mathematics?—Yes, they all study mathematics for nearly three hours every morning; the first hours in the morning are devoted to mathematics. The staff of instructors in mathematics I consider to be sufficient.

271. How many classes are there in mathematics?—For these voluntary students there are two classes, a higher and a lower. The best of the mathematicians join Professor Lambert's class with the gunnery lieutenants.

272. That is to say they go out of their own class?—No; I consider the one class to be their own just as much as the other; it entirely depends upon their ability in mathematics which of the two they join. Professor Lambert takes a considerable number, but I do not remember how many. I am glad to say that

he has been able to take in his higher class a greater number of them than usual this session. The remainder constitute the second class under the charge of two instructors, Mr. Laughton and an assistant. So that altogether we have four instructors occupied in their mathematical instruction; Professor Lambert and his assistant Mr. Glead, Mr. Laughton, who has charge of the lower class, and his assistant Mr. Solomon. I consider those four instructors to be quite sufficient with our present number of voluntary students. Mathematics is their only obligatory subject of study. We expect them to take up at least two other subjects, but the option is left entirely to them.

273. You can provide them with instruction in physics and practical physics, in chemistry and practical chemistry, in navigation and nautical astronomy, in marine surveying, in permanent and field fortification, in military surveying and drawing, in military history, in French, German, and Spanish, and in free-hand drawing. Of all those they take their choice?—Yes; they take their choice. I may say with respect to their instruction, that on the whole it is adequate in all the subjects which they may select.

274. (*The Rev. H. A. Morgan.*) Are any of them very backward in mathematics?—Yes; some of them are certainly very backward in mathematics; they have forgotten almost all they knew; most of them learnt it, of course, on board the “Britannia.”

275. But they have forgotten it while at sea?—There are exceptions of course, but a great many have practically forgotten it.

276. They must have recourse to private tutors, I suppose?—No; they have quite enough instruction here. This mathematical study in the morning is of great utility to them; amongst other things, it promotes steadiness of purpose and habits of precision. They derive also a direct advantage from it, for they cannot open a book now on physics, on steam, on navigation, in fact on any of the subjects in which, professionally, they are most interested, which is not full of mathematical formulæ, and that would, of course, be an unknown language to them unless we were to give them a preliminary drill again in mathematics. It should be added that many officers recall their mathematics very rapidly; many are able to join the higher class after a month or two of recapitulation.

277. Are most of them anxious to obtain as much information as they can in their various subjects of study?—Yes; most of them are.

278. (*Chairman.*) Are any of those voluntary students sent away because they are inattentive, or do not make a good use of their time?—Yes, I am glad to say that our President looks very carefully to this point.

279. He will not let any remain who do not make a good use of their time?—No, he will not; I am happy to say, however, he has not had to make use of such strong measures frequently; he has done so on one or two occasions only, but then with excellent effect. May I now mention a subject which is not provided for, but for which I should be glad if provision could be made. You have alluded, amongst those subjects, to that of marine surveying.

280. That is taught on Her Majesty's Gunboat “Arrow”?—The “Arrow” takes officers down the river for practical work in surveying; but in connection with marine surveying there is a certain amount of astronomical work, in which many of them would be very glad to receive instruction. We have here a small observatory which was formerly connected with Greenwich Hospital School; it is fairly well provided with instruments, and these have recently been put into practical working order; it would be of great utility to many naval officers to be able to take observations with such fixed instruments. They are all of them well acquainted with the sextant and the instruments in use on board ship, but many of them would like to have instruction in the use of fixed instruments. Now at present we have no one to give them such instruction. Our present in

structor in marine surveying, Captain Johnson, has had great practical experience, and is thoroughly well informed on all those points which naval officers are most commonly interested in and engaged with; that is to say, on all matters connected with observations at sea, and with coast surveys; but he does not profess to have a knowledge of fixed instruments such as we meet with in observatories. Many, or at least several of our officers would be glad to have such instruction; but, as I said, we have at present no means of giving it to them.

281. (*Mr. Lingen.*) Would it be of professional value to them?—Certainly it would be of professional value to them in connection with larger surveys. For instance, they might have to connect their surveys with fixed observatories on shore, and a knowledge of the instruments in question would be decidedly advantageous for that purpose. Moreover, a naval surveyor of high standing ought not to be ignorant of what observation with fixed instruments is; no one, for instance, who could take the position of Captain Shortland, as many of our officers no doubt aspire to do some time or other, ought to be ignorant of the process of observation with fixed instruments. There are several officers in the college, or who have passed through it, who would have liked to have had instruction in practical astronomy, but we have not been able to let them have it on account of the staff not being complete in this direction.

282. (*Chairman.*) An instructor then, is wanted for that purpose?—Yes; and I think he might perhaps, in addition, render occasional assistance to Captain Johnson, whose classes are sometimes large ones.

283. (*Mr. Lingen.*) How far is the Royal Observatory from the college?—Not far.

284. It would be only a few officers who would be likely to turn to account the practice in the observatory; could they not, on the recommendation of a professor, attend at the Royal Observatory, and use the instruments there; if they did so, they would see observations on a larger scale and much more perfect altogether than they could in the observatory annexed to the college?—They might do so, certainly, but I am not prepared to say that the Astronomer Royal could receive them; however, if he could find room for them, our officers might obtain there the knowledge they seek.

285. Everything that would be necessary, even for an officer of the highest promise and attainments, you think could be provided for him in the observatory which exists in connexion with the college?—I certainly think so.

286. (*The Rev. H. A. Morgan.*) Would you desire this observer to have an acquaintance with mathematics. In the observatory at Cambridge I think there are two assistants there who do a great deal of work in connexion with observing. There is also one gentleman there who is a very distinguished mathematician, Professor Adams?—Mr. Christie, who was there, is an accomplished mathematician, I believe.

287. He is not there now?—No, he is at the Royal Observatory, Greenwich, now. The mathematical acquirements of the instructor we require need not be of a very high order.

288. (*Chairman.*) I see it is stated in the first report of the Committee which considered the establishment of this college that "the observatory" belonging to Greenwich Hospital School will be "available for the use of the students of the college," it is so, is it?—Yes, and I am very glad you have mentioned that. I daresay you will find it noticed also that it was contemplated that the instructor in marine surveying should have charge of those instruments. As a matter of fact that intention could not be realised. The staff commanders of the navy, to whom we must look for instruction for our sub-lieutenants and others here, do not as a rule know much about observation with fixed instruments. On

asking Captain Johnson if he was prepared to take charge of the fixed instruments and to give instruction in their use, he replied at once that he was not prepared to do so.

289. (*Mr. Lingen.*) Is no use made of this observatory at present?—No use is made at present of the college observatory.

290. Is use made of it for Greenwich Hospital School?—None whatever.

291. Then it is absolutely standing idle now?—Yes, it is waiting to be made use of.

292. Has anybody, since it was erected, ever made use of it?—Yes.

293. What sort of people?—When the school was a higher school of navigation than it is now, it was very much used by the pupils of the school; it was for them, I believe, that it was founded.

294. The school has been reduced in its range of studies?—Yes; the observatory, being no longer required for its original purpose, was handed over to the college. Thereupon the first step was to have the instruments put in proper order, and that was done six or eight months ago. The next question was as to the appointment of an instructor. Eight months ago the present committee was in contemplation, and it was expected that its inquiries would soon commence; no immediate application for an instructor, therefore, was made.

295. If a thoroughly competent person for the manipulation of those instruments was in attendance there, you would not want more than that?—No, not more than that.

296. (*Chairman.*) For that purpose you do not want a high mathematician—you want only an experienced man?—Experienced in the use of the instruments, and also able to teach others how to use them.

297. The special lectures seem to be of very considerable importance here, at least there are a good many of them given. I suppose those are arranged by yourself from time to time?—Yes.

298. They are not given by professors, but by any persons whom you may engage for that purpose?—Sometimes by our own professors and instructors, and sometimes by competent authorities outside the college.

299. In Easter Term I see there were five lectures given on military tactics?—Yes.

300. Eight on meteorology, five on structural arrangements of ships of war, three on magnetism, and one or two courses on navigation and nautical astronomy?—Yes.

301. Were those given by persons unconnected with the college?—Not all of them. The lectures on navigation and nautical astronomy were given by our head naval instructor for the sub-lieutenants, and they were attended not only by the sub-lieutenants as a part of their course, but also by many voluntary students; there was no additional provision made for those.

302. He was not paid extra for those lectures?—No.

303. But if you bring in a person from a distance to give a lecture, of course he must be paid?—Yes.

304. Were those lectures on military tactics, on meteorology, on structural arrangements of ships of war, and on magnetism, given by persons connected with the college?—I must ask you to go through them individually.

305. Were the five lectures on military tactics given by any one connected with the college?—Those lectures were given by Captain Needham, Professor of Fortification, who was then assistant professor at the college. They cost nothing.

306. Then the eight on meteorology?—They cost nothing. Mr. Laughton gives them as lecturer on meteorology as well as instructor in mathematics.

307. He is bound to give them?—Yes; they too are attended by sub-lieutenants as well as by many voluntary students.

308. Six lectures on structural arrangements of ships of war?—That was a special course. We asked

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Mr. White of the Admiralty to give those lectures. He is one of our instructors, and a very competent authority on the subject; moreover, it is one which interests not only the naval architects, whom he has to instruct specially, but also our half-pay officers; accordingly he was asked to give that course of lectures for a special fee.

309. Three lectures on magnetism?—Those were very technical in character; they were given by Captain Mayes, the Superintendent of Compasses at Deptford.

310. He is not connected with the college?—No, and they were given for a special fee.

311. In the Midsummer Term there was a lecture on the atmosphere; was that given by Professor Tyndall?—Yes; that was given by Professor Tyndall at a time when the question of fog signals was an interesting one to all officers; he happened to have made investigations on that subject, the results of which he kindly imparted to us here at my request; his lecture was very much appreciated.

312. And it was practically very useful, I suppose?—Very useful.

313. He found out that fog was not any obstacle to the conveyance of sound, but rather favourable to it; was not that so?—He did not say that it was favourable; but rather that it did not obstruct sound to the extent hitherto supposed.

314. There were six lectures given on international law?—Yes, those were also highly appreciated by our officers; they were given by the Right Honble. M. Bernard. I do not know where they could get such lectures elsewhere. They were costly, I admit, but they were exceedingly valuable.

315. Were they paid for at the rate of ten guineas a lecture?—I believe they were; but it was Mr. Goschen who, on the first occasion, made special arrangements with Mr. Bernard. For his last course, ten guineas a lecture were paid; that is our maximum fee for lectures.

316. Then there were six lectures on naval history?—Yes, those were given by Mr. Laughton; the Admiralty made a special provision for that course, and increased Mr. Laughton's salary by a certain amount, I forget exactly how much, in consideration of his giving those lectures annually. Therefore we may say they have now become a part of the college course; they will no longer be given as extra lectures, but will recur once every session.

317. There were four lectures on marine engineering?—Yes; those were important lectures for our engineers, and they were also attended by many voluntary students; they were given by Mr. Bedbrook, an engineer in the navy, and for a special fee.

318. (*The Rev. H. A. Morgan.*) Are all those lectures compulsory on all the students?—No; not at all.

319. (*Chairman.*) We need not go through them all; there were some lectures on applied mechanics and some on shipbuilding?—Those were given by the instructors of the college, and involved no extra fees. I should mention that they were all given for special purposes. For instance, take applied mechanics; after our voluntary students here have gone through their ordinary theoretical course of mechanics, it is of immense importance that they should get a knowledge of applied mechanics; it is quite a distinct branch of the subject, and when they are sufficiently prepared (that is about the third term of the session), they can attend lectures on it with great advantage. Shipbuilding, again, although it is a subject in which naval architects and marine engineers are most interested, still Mr. Baskcomb's lectures can, with advantage, be attended by many executive officers. Short courses of lectures on professional subjects, conveying, in as popular a manner as possible, the most advanced knowledge of the day are particularly useful to our officers. Mr. Bedbrook, for instance, spoke to them in his lectures of some recent experiments which had been made in the dockyards on marine

engines, and of the most recent improvements that had been made. From Mr. White, who is connected with the Controller's Department in the Admiralty, they learnt what are the most modern improvements in the construction of ships, and the points to which attention is being specially turned. Not only our naval architects, but our executive officers also, had an opportunity of learning these things, and no doubt can be entertained of the value of the information to them; never before, probably, have they had so good an opportunity of getting a general knowledge of the present position of naval architecture, and of the opinions held by persons of high standing in the profession on questions in which they are directly interested.

320. As to those subjects, you think it is better not to have them provided for absolutely as part of the regular course, but to make provision for them as opportunities arise, without having officers on the staff to give those lectures. You prefer to call in from time to time those persons who, you think, are the most competent to give the best instruction on those subjects?—Yes; unquestionably.

321. (*Mr. Lingen.*) Or to invite your own officers outside the usual programme to give a somewhat more general exposition of what they have to say on those subjects?—Yes; I think that is most decidedly the best arrangement. I do not think we could say beforehand, with regard to these special subjects, what we should want. Lectures of the kind now under consideration, ought to be varied from session to session. It is now two years since we had a course of lectures on metallurgy; it is not necessary to have a course every session, perhaps; probably every other session would suffice.

322. It is necessary to revive the tradition from time to time?—Yes; our three-year students of engineering and naval architects should not leave the college without having heard lectures on the subject, but it is not necessary that they should have a course every year.

323. These lectures are as much under your own control as the general arrangements of the lectures of the college?—Yes.

324. (*Chairman.*) In the first report of the committee on the college it was recommended that provision should be made for lectures in geology, in natural history and botany, and also in hygiene, but no lectures appear to have been given last year in any of those subjects?—No.

325. You would not throw them out altogether as unworthy of attention, nor on the other hand would you have lectures regularly given on them, but you would have lectures as occasion may require and as opportunities offer?—Yes, we might occasionally like to have lectures on those subjects. Up to the present time I have not recommended them, or thought of doing so, because we have had no room for them; the time of our students being fully occupied.

326. (*The Rev. H. A. Morgan.*) Are those lectures open to all the students in the college?—To all the voluntary students, yes; but not necessarily to others.

327. Are they attended by a large number?—Yes, by a very large number, and not only by the students in the college, but by officers in town.

328. At what time are the lectures delivered; in the evening?—Generally from 12 to 1 o'clock; never after 5 o'clock.

329. (*Chairman.*) Do you let it be known that they are open to naval officers generally?—Yes, generally to naval officers; we send notices to the naval clubs. I may observe, that although there would be no harm in deciding beforehand what amount in the way of fees for extra lectures shall not be exceeded, the choice of subjects should, I think, always be left to be decided as occasion may arise.

330. You would not like the students to miss an opportunity of hearing a valuable lecture because there was no source out of which the lecturer might be paid?—No.

331. (*The Rev. H. A. Morgan.*) Was this course drawn up by yourself?—Yes.

332. Is there any difficulty in finding payment for lectures?—There has been; some who, in my opinion, should have been remunerated, received nothing; others, Mr. White, for instance, were, I think, insufficiently remunerated.

333. He is one of the staff here?—Yes; he gives practical instruction to our students of naval architecture; but this lecturing is quite special work, involving great labour, and that of a highly skilled character.

334. (*Chairman.*) Then you think that there ought to be a sum of money available for the purpose, and that remuneration ought to be made to the officers of the staff for occasional lectures delivered by them, in addition to their regular stipend?—Yes; occasionally.

335. At present there is no such means provided, so that either the lecture is not given or the lecturer is not paid for it?—Just so.

336. (*The Rev. H. A. Morgan.*) Did Professor Tyndall receive anything?—The Admiralty offered him the usual fee of 10 guineas, I believe; but he returned the balance left after the actual expenses had been paid.

337. (*Chairman.*) It seems to me that we have pretty nearly gone through the first branch of the subject referred to us, but if any further observation occurs to you upon it afterwards perhaps you will have the goodness to make a note of it?—I will do so.

338. (*Mr. Lingen.*) In the case of the acting sub-lieutenants as well as in that of the engineer students, would you consider it advantageous to have an examination for admission which should involve the rejection of unqualified candidates?—With our yearly examinations afloat I see no reason for having an examination on entry. Those same sub-lieutenants are examined afloat every year.

339. (*Chairman.*) Twice a year?—Yes; once by the examining staff of the college, and once by the naval instructors afloat.

340. (*Mr. Lingen.*) But to put the most extreme case one can, in order to try the principle, supposing the results of all the twelve examinations undergone by an acting sub-lieutenant in the six years at sea were unsatisfactory, would that acting sub-lieutenant be prevented from entering the college?—No, he would have to enter as a matter of course. I should not be prepared to recommend any other procedure; for although he may have passed bad examinations afloat, yet when he comes here he may see the necessity of setting to work earnestly, and he may really work well, and pass his examination creditably at the end of six months.

341. The number of such persons in the college has a considerable bearing upon the number of instructors that are required. If they come in ill-qualified, inasmuch as they must pass a fixed test at the end of six months in proportion as the student

furnishes less, the instructor must furnish more?—Yes; but the difficulty in passing after six months' study here has been greatly exaggerated. It has now been proved, beyond all doubt, that a sub-lieutenant of very average capacity can, with ordinary diligence, pass that examination—there is not a question of that. The failures that have taken place may for the most part be accounted for by habits of intellectual indolence, contracted afloat or elsewhere; the result of which is that they will not get to work promptly, and time, precious time to them, is wasted. You may count on your fingers those that have failed from lack of ability during all the time that the new regulations have been in force for sub-lieutenants—they would not exceed three or four.

342. (*The Rev. H. A. Morgan.*) Where do the students live, do they live in the town?—No, they have rooms in the college.

343. Are they under discipline here?—Yes, but they have a good deal of liberty also.

344. But they have to be in college by certain hours, and so on?—Yes.

345. (*Mr. Lingen.*) Looking at it from an instructional point of view, you do not think it an indispensable matter that there should be a rejecting entrance examination?—No, I do not. With 75 sub-lieutenants we can deal very well, even if amongst those 75, there should be some who are very backward. I consider our present staff to be good and strong enough to lift even backward sub-lieutenants over their examination, provided they work at all creditably. I could tell many well authenticated stories of officers who, after having barely got through their examination, have fully asserted that it was only during the last month or two that they really worked at all hard.

346. The sum total of marks is 1,500, I think?—Yes.

347. 1,250 puts a man in the first class?—Yes.

348. Is not 1,250 a large proportion to make out of 1,500 in any examination?—Yes, it is designedly so; a first class is a mark of real distinction.

349. (*The Rev. H. A. Morgan.*) It is a very small first class, I suppose?—Yes, the numbers who take a first class are very small indeed.

350. How many classes have you?—Three.

351. Depending on the number of marks?—Yes.

352. (*Chairman.*) Does the custom still prevail of assigning the same value to all questions, whether easy or difficult, in the same paper?—The custom never existed in my time.

353. You are aware that such a thing did exist?—I remember seeing it so stated in the report on the "Britannia" examinations.

354. The values are now given according to the relative ease or difficulty of the questions?—Yes, certainly, and even parts of a question are so evaluated. The sum of the values of such parts may be equal to the value assigned to a more difficult question, but in no other sense would the equality of the values given to the answers of different questions be tolerated.

The witness withdrew.

Adjourned to Tuesday next.

*Dr. T. A.
Hirst, F.R.S.
10 Nov. 1876.*

At No. 1, New Street, Spring Gardens, Tuesday, 14th November 1876.

PRESENT :

THE REVEREND O. GORDON, B.D., IN THE CHAIR.

THE REVEREND H. A. MORGAN, M.A.

R. B. W. LINGEN, Esq., C.B.

C. D. LOVELESS, Esq., Secretary.

Dr. T. ARCHER HIRST, F.R.S., further examined.

Dr. T. A.
Hirst, F.R.S.

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355. (*Chairman.*) Can you tell us exactly how many students of naval architecture and of marine engineering were last year going through a three years course, how many through a two years course, and how many through a one year's course, excluding the acting sub-lieutenants?—Yes.

356. It appears from page 2 of Admiral Fanshawe's report that there were 15 students of naval architecture and 32 students of marine engineering; were they all going through a three years course?—No; the 15 naval architects who are there mentioned are all going through a three years course undoubtedly; they include the nine who came from the dockyards, and six foreign, private, students. Amongst the 32 students of marine engineering there must be six from the dockyards, who were going through a three years course, and one English and two foreign, private, students, who were also going through a three years course; the remaining were going through a one year's course only. We have no students of marine engineering who are going through a two years course only.

358. The shipwright apprentices are included, then, in the 15 who have been mentioned?—Yes; a student of naval architecture is necessarily either a shipwright apprentice, or a private student.

359. (*Chairman.*) Those 15 and 32, together 47, constitute three classes for instruction, do they not?—Two classes in mathematics, or rather two classes each consisting of two divisions. They are the classes to which we refer in some of our documents as A₁ and A₂.

360. Those 47 students have four instructors in mathematics, have they not?—Two for pure and applied mathematics and two for applied mechanics. I mean, by two, the professor and his instructor, of course, in both instances; that makes four if you count applied mechanics.

361. And those two professors in mathematics are quite sufficient for the 47 students?—Yes; there is one professor of mathematics, pure and applied, and one professor of applied mechanics; they, with the two instructors, are sufficient.

362. When it is said that these "classes have pursued their studies in mathematics and applied mechanics daily in the forenoon," that means that the professors or instructors are with them for three hours, I suppose?—Yes.

363. Both giving lectures and assisting them individually?—Exactly.

364. Then I will pass on to the 18 lieutenants qualifying for gunnery officers, with whom are associated the probationary lieutenants of Royal Marine Artillery, who seem to be four in number?—Yes, of the second year.

365. They are instructed by Professor Lambert, and either Mr. Henry, during part of the year, or Mr. Gleed, during the rest of the year?—By Mr. Gleed solely, since Mr. Henry is no longer at the college.

366. I suppose their instruction is all that is necessary in mathematics?—Yes.

367. And in other subjects also?—With the single exception to which I alluded at your last meeting, with reference to fortification.

368. You stated that Captain Needham required assistance?—Yes.

369. I am going over what I asked you the other day in order to be perfectly sure that we understood you correctly then. The probationary lieutenants of the Royal Marine Artillery form another class, do they not?—You have just mentioned those in their second year.

370. I have been speaking of the probationary lieutenants of the Royal Marine Artillery. I now refer to the probationary lieutenants of the Royal Marines?—I think I mentioned the other day that we have now no longer any probationary lieutenants of the Royal Marine Light Infantry at the College; we have now solely those of the Royal Marine Artillery; those just alluded to, and the eight in their first year, to which I referred last Friday.

371. As regards the half-pay (executive) and marine officers appointed for a voluntary course of study, you think there is ample instruction for them if their number does not exceed 75. I believe you stated that to us on Friday?—The 75 that I spoke of were the sub-lieutenants only; they are executive officers, but not voluntary students. For those sub-lieutenants, provided they do not exceed 75 in number, our present staff is sufficient. As regards the voluntary students they are also sufficiently well provided for.

372. I see they were 109 in number?—About that.

373. (*Mr. Lingen.*) I notice that of those 109 only 93 came up for examination; the other 16 I suppose simply quitted the college without having subjected themselves to examination?—Yes; many were appointed to ships, and quitted the college in consequence.

374. With reference to the special courses of lectures mentioned on page 4 of Admiral Fanshawe's report, I think I understood from your former evidence that the great use of these lectures was not to provide for the fluctuations of numbers between 102 acting sub-lieutenants, for instance, who were at the college in February, and the 47 who are there now; but that their principal use was as a kind of supplement to the ordinary instruction of the college; am I right in that?—Quite right. The use of those lectures is to supplement the ordinary instruction of the college on subjects which could not well be introduced in the ordinary courses of instruction.

375. Then looking at the names of the gentlemen by whom those lectures are given, we find on page 5 the names of Captain Needham, Mr. Laughton, Mr. White, Mr. Hearson, and Mr. Baskcomb, all of whom are members of the ordinary staff of the college?—They are, and most of them have given those occasional lectures without any fee. These lectures constitute an addition to the ordinary college work; more officers can, and do attend them than can attend the regular classes. The case of Mr. Hearson, for instance, is a case in point, and so, also, is the case of Captain Needham. Those lectures on military tactics were attended by a great many more officers than attend Captain Needham's usual classes.

376. Do these lectures usually originate in the suggestions of the gentlemen who give them (I am now confining my question to those who are upon the staff of the college), or do you, in your general supervision of the college, when you think that one of these lectures would be useful, suggest it to the

gentleman who gives it?—They originate sometimes in the one way, and sometimes in the other; and sometimes, too, from expressed wishes on the part of officers studying at the college. I could not say that the suggestion originates, generally, from me, because frequently it has originated from a conversation, either with instructors or with students. Sometimes the suggestion has come entirely from the instructors.

377. But the lecture is not given excepting with your approval and after discussion with yourself, and, as a mere formal act, I presume it is ordered by you as director of studies. When the lecture is finally given, you approve of it and direct it to be given?—I recommend to the President its being given, and he directs that it shall be given in case the suggestion meets with his approval.

378. At that stage it fulfils all the conditions, so far as authority and sanction goes, that any ordinary lecture would that is given in the usual course of the syllabus?—Yes.

379. Do you think that the system is upon a wholly satisfactory footing at present, that the gentlemen who are upon the staff of the college should have this rather indeterminate amount of work thrown upon them, sometimes with claims to remuneration and sometimes apparently without any remuneration?—I do, provided confidence is placed in our judgment.

380. What is the line which would separate a remunerated lecture from an unremunerated lecture, both being given by a salaried member of the establishment?—The line of separation could not well be defined; generally, I should say that if the subject were closely connected with his own instruction, the question would then arise whether the instructor might not give the extra lectures without a fee, provided that his time in the college were not too much occupied, or that suitable provision as to time could be made. If, however, he had to depart more or less from the precise line of instruction that he has undertaken, great additional labour might be involved during his spare time, and then a claim for some additional remuneration might I think fairly be entertained.

381. By whom would that claim be reported upon—by yourself?—Yes, by myself to the President.

382. To that extent, a gentleman who gave a lecture not connected with his subject of instruction, would, so far as the tendency of the regulations went (I am not saying that he would be actuated by that motive) be under a discouragement against lecturing on the subject which he knew best, that is to say, his own subject of instruction, because he would get no fee if he gave a lecture upon it, and there would be an inducement to him to lecture on an extraneous subject, for which he would apparently get a fee?—That view might possibly be taken, although, in reality, I do not think it is. As I said, before asking an instructor to give an extra course of lectures, I should consider well what duties he had already to perform, what additional labour the preparation of such lectures would involve, and what antecedent knowledge of the subject he had acquired. After we have obtained from an instructor what we can fairly claim in the way of time, if he likes to undertake additional work in the shape of a special course of lectures for which further research is required, for which preparation must be made during his spare time, and for which, possibly, he may have to draw upon experiences formerly acquired, then I think a fair claim may be made for additional remuneration.

383. You have not found any practical difficulty yourself in deciding whether a lecture should be remunerated or not?—No.

384. I observe that a comparatively small sum is put down in the estimates for these lectures; it amounts to little more than 200*l*. I think; are most of them unremunerated?—Yes, I believe so. Perhaps you will allow me to go through the list and point out those which have been remunerated. The first is military tactics. These lectures were given without remuneration.

385. May I ask what Captain Needham's official position is as a lecturer? What is he required to lecture on as part of his duties in the college?—Captain Needham at the time he gave these lectures held the position of assistant to the professor of fortification, and as such gave lectures in military history; he now holds the professorship. Then there were some lectures on meteorology given by Mr. Laughton; he was not remunerated for them.

386. (*Chairman.*) He is a professor in the college?—He is an instructor in mathematics, and lecturer in meteorology. Then there were some lectures on structural arrangements of ships of war by Mr. White; he had a fee.

387. He is a professor or instructor in the college also, I think?—He attends at the college twice a week to give practical instruction in the design of ships.

388. (*Mr. Lingen.*) His official duties being in the constructor's department of the Admiralty?—Yes. This is a case in point. We have no further claim on Mr. White's time than is involved in his attendances twice a week at the college to give actual instruction. He has an appointment at the Admiralty, is an excellent lecturer, and has exceptionally good opportunities at the Admiralty of obtaining information on matters in which our executive officers, as well as our students of naval architecture, are interested. For the preparation of a special course of lectures for us, he is, I submit, entitled to a fee; and, moreover, I think he has merited a higher fee than any he has yet received.

389. Would the particulars which were included in these lectures on the structural arrangements of ships not be included in those lectures which Mr. White gives during his attendance twice a week?—No.

390. Would these lectures be more advanced, or in what respect would they differ from his ordinary instruction?—They were more general in character; they related rather to the present and part structural arrangements in ships than to the methodical treatment of the subject of ship designs, on which Mr. White gives lessons.

391. They would be historical rather than scientific, or as well as scientific?—They were partly historical, partly scientific, and specially adapted to an audience consisting of executive officers, as well as of students of marine engineering and naval architecture. Then there was a course of lectures on magnetism by Staff-Commander Mayes; he is not on our staff.

392. (*Chairman.*) I suppose Staff-Commander Mayes was paid for those lectures?—Yes. The course of lectures on navigation and nautical astronomy was not paid for. Those were the regular lectures, which are given by Mr. Oborn to the sub-lieutenants; we merely give our voluntary students an opportunity of attending them with the sub-lieutenants.

393. Mr. Oborn is paid, I suppose?—He is not specially paid for those lectures; they form a part of the ordinary duties which he performs for his salary.

394. (*Mr. Lingen.*) Then are those 30 lectures given twice over, once as ordinary lectures and once as special lectures?—No; he regularly gives those lectures to sub-lieutenants. He gives three or four courses every session, and when our voluntary students are sufficiently advanced in trigonometry and mathematics to appreciate those lectures we give them an opportunity of attending them; that may be during the third term, or it may be during the second term of the session. They simply enter the room where the sub-lieutenants are, and listen to the lectures which the sub-lieutenants are receiving. Then we come to Professor Tyndall's lecture; for that, as I before stated, a fee was offered, but not accepted.

395. And Mr. Mountague Bernard's?—He not being on the staff, his lectures were, of course, paid for.

396. Then there were some lectures on naval history?—Yes. As I mentioned on the last occasion, Mr. Laughton is our instructor in mathematics, as well as lecturer in meteorology; he has, however, made special researches in naval history, and is able to give

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us lectures on the subject, which we could with difficulty obtain outside. His salary was increased by the Admiralty, by a small amount, in consideration of his giving us this course on naval history once a session.

397. But he has no special fee for it?—No.

398. You have in his case then a somewhat different arrangement. You have an officer whose permanent salary is raised in consideration that he gives a certain specific number of lectures on what we may call an additional subject; do you think that that system would be applicable to the whole of the officers of the establishment?—No, I think not. Permit me to state that this was done independently of any recommendation of mine. It was by order of the Admiralty, probably in consultation with the Treasury. My recommendation was, that Mr. Laughton should have a special fee for these lectures on naval history.

399. You would prefer that that state of things should be restored?—I should, because I do not think it desirable that this same course on naval history, or indeed any particular course, should be repeated session after session.

400. (Chairman.) If the same things are repeated over and over again, why not have them printed in a book, and let the students buy it?—Just so. But the Admiralty, for reasons which are not entirely known to me, thought it better to increase Mr. Laughton's salary a little on the understanding that he was to give a course of lectures on naval history once during every session. The increase, I may observe, was not sufficient to induce Mr. Laughton to vary his course frequently.

401. (Mr. Lingen.) I think that the account of that arrangement is probably something of this kind; when these special fees come under the notice of the Treasury, not looking at it from an educational, but simply from an administrative point of view, there is a sort of *primâ facie* or matter of course objection, that a man who receives a salary, and is supposed to give his whole time to his duties ought not, from the public at any rate, to be receiving additional payment for similar duties. I have no doubt that in the case of this particular set of lectures, the Admiralty more or less yielded to or met the Treasury upon this general administrative ground, whereas in other cases the arrangement of paying a special fee has been allowed to continue.—I trust it will continue to be so allowed.

402. Looking at it educationally, your decided opinion is, that you would have much more control over these lectures, if a fee was given for them; than if they were included in the salary?—I think so.

403. Mr. Bedbrook is not on the staff, is he?—No.

404. Did Mr. Hearson receive a fee?—No, he received no fee. The subject on which he gave these lectures is a subject which he teaches to the students of marine engineering, and naval architecture, as assistant to Professor Cotterill. All we asked from him was to make a selection from the subjects upon which he instructs for the benefit of our voluntary students. He had time to do this at the period, and therefore I did not think it necessary to ask for a special fee for him. Mr. Baskcomb has not received any special fee for the lectures on practical shipbuilding. I may state, however, that I should be inclined to recommend that a fee should be given to Mr. Baskcomb, in future, for such lectures.

405. (Chairman.) Is he on the staff now?—Yes.

406. What would be the reason for his having a special fee?—According to the present arrangement I am compelled to ask him to give these lectures in one of the hours during which he attends at the college, and by so doing I deprive the students of naval architecture of his practical instruction. I should prefer Mr. Baskcomb's being left to give his full time to his ordinary instruction twice a week, and being asked to give specially at other times this course of

lectures on practical shipbuilding, lectures which are attended by engineers and other officers in the college.

407. (The Rev. H. A. Morgan.) Mr. Oborn is one of the regular staff of the college. I presume?—Yes.

408. (Mr. Lingen.) I should like to ask you respecting the holding of examinations by members of the staff. At page 7 of the Report we have the principal facts on that subject. If I rightly understand the matter all papers are set on the responsibility and under the direction of yourself, but a certain number of these examinations have to be presided over, and the discipline maintained, and the actual examination performed by various officers, and those duties, I think, are occasionally undertaken by salaried officers of the Government. I do not know whether they are members of the college or not?—For the college examinations held in June we have now external examiners solely; that is to say, the questions are set, and the answers reported upon by persons not on the college staff. During our first session that was not exactly the case, but we have settled down into that system now.

409. (Chairman.) Can you give us particulars on that point? We have not the appendix before us in which the names of these examiners are given?—I have the materials here. At the last examination these were the examiners: Messrs. Niven and Taylor in mathematics. They are not on the staff.

410. Professor Niven comes from Cork; does he not?—No, that is his brother.

411. He was a senior wrangler?—He was a high wrangler.

412. Professor Williamson, of University College, London, Professor Unwin, of Cooper's Hill College, and Professor Reynolds, of Owen's College, Manchester, examined for us in chemistry, applied mechanics, and the theory of the steam engine respectively. Dr. Wormell, who was formerly on our staff, but is now head master of one of the large city schools, examined in descriptive geometry.

413. (Mr. Lingen.) Of the City Middle Class School, I think?—Yes. Mr. John at Lloyd's examined in the stability of ships, &c., and Captain King at Sandhurst in military history and fortification.

414. (Chairman.) What is Captain King's position at Sandhurst?—He is an instructor in the Military College at Sandhurst.

415. Not at the Staff College?—No. Professor Karcher examines in French; he is at Woolwich. Dr. Rost examines in German; he is in the Indian Department. Señor Carrias examines in Spanish; he is at King's College, London. Mr. Wright, who is at the Admiralty, examines in engineering, and Mr. Barnaby, who is chief constructor at the Admiralty, examines in naval architecture. Staff-commander Harris at the Admiralty examines in marine surveying. All those examiners therefore are entirely outside our college.

416. (Chairman.) They conduct the final examination of all classes?—Yes.

417. (The Rev. H. A. Morgan.) Who conducts the examinations in these special courses of lectures. For instance, who would examine in Professor Tyndall's lecture?—The examination in it was included in the examination in physics. I ought to have stated that the examiner in physics is Professor Rücker, a Professor in the College of Science at Leeds.

418. Would Captain Needham, for instance, examine in the special course of lectures given by him?—Yes, examination in special courses are exceptionally treated sometimes, we often ask occasional lecturers to set the examination papers in the subjects of the lectures they have delivered; in many cases no other examiners could be well employed. But the lecturer does this without a fee. He is always given to understand at the commencement that his fee, if a fee be given to him, will include both his lectures and the examination paper at the end of it.

419. Do those gentlemen who give occasional lectures without being connected with the college

receive any fee when they examine?—No; that is what I was endeavouring to explain. The fee they receive is for examining as well as lecturing.

420. That applies even to those gentlemen who are not connected with the college?—Yes. For instance, Mr. Mountague Bernard, at the termination of his course of lectures, 6 or 10 in number, sets a paper of questions on the subjects he has treated, and he looks over the answers written by the students.

421. That must involve a considerable amount of labour, because as marks are awarded to these papers, a large number would go in for the examination I suppose?—Yes, perhaps as many as 100 have attended Mr. Mountague Bernard's lectures, and he has looked through all those papers.

422. He does all that amount of examining without any fee?—Without any additional fee beyond what he has already received as a lecturer.

423. (*Mr. Lingen.*) Is attendance at these special lectures compulsory upon any one?—The lectures on meteorology and nautical astronomy must be attended by the sub-lieutenants; and the students of marine engineering and naval architecture are directed to attend certain other occasional lectures.

424. I suppose the examination papers which are prepared by those gentlemen who give the special lectures, follow the nature of the lecture itself, they are compulsory or voluntary according as attendance at the lectures is compulsory or voluntary?—Yes.

425. I think you stated that the sub-lieutenants do attend the lectures on meteorology compulsorily?—Yes.

426. Does Mr. Laughton examine them in that subject?—No, Mr. Goodwin, our permanent examiner, examines the sub-lieutenants in meteorology, as well as in navigation and nautical astronomy. These lectures, as I stated, are frequently repeated and well defined.

427. He is on your staff but gives no instruction at all?—That is so. Our rule is that those who are passing an examination after an obligatory course of study at Greenwich are never examined by any one who has taken part in their instruction. In the case of those occasional lectures which I have now been speaking of, and which are attended by the voluntary students, the lecturer is, by way of exception, the examiner; but I need not say that in lecturing he does not come into personal contact with students, as he does in teaching.

428. But with regard to the papers which are set so far as the college prizes are concerned and those on which the half-pay officers being able to get a "G" or any other letter attached to their names depend for that purpose the lecturer would both set the paper and look over it?—Yes; sometimes he does.

429. (*The Rev. H. A. Morgan.*) Do you approve of that system on the whole?—I see no objection to it in the case of those occasional lectures which are now under consideration. Let me add, however, that a comparatively small number of marks are given for them. You will find in my list that not more than 200 marks are ever assigned to the subjects of special short courses of lectures.

430. (*Mr. Lingen.*) With respect to the final examinations you direct the studies and you would of course have the results before you for your own information, but as far as the passing or the rejecting of individuals goes that is done by outside examiners is it?—Their marks are always taken.

431. Their marks simply come into your hands afterwards as the data by which you would judge of the progress and the proficiency of the college?—Yes, and also for supervision. In case a question was put which was beyond the reading of our students, I should represent to the examiner that such was the case, and put it to him whether, in consideration thereof, some accommodation of marks might not be desirable. The final decision on the point rests, I need not say, with the examiner himself.

432. I suppose where Admiralty officers are employed to conduct the examination it is upon

subjects in which it would be exceedingly difficult to find the same knowledge outside the officers of the Admiralty?—It is.

433. The only other question I wished to ask you was with reference to the enormous mass of examination papers which you apparently have to set and look over yourself—do you not find your time very greatly oppressed by this formidable list which is given in page 7 of Admiral Fanshawe's Report?—My work has been rendered very heavy indeed by these extra college examinations. Every examination paper set for the students of the college, as well as for candidates outside, must go through my hands. I have to examine it with the view of seeing that it is appropriate to the instruction which has been given and to the regulations in force. I set no papers myself.

434. That would apply to the final examination as well as to the others?—Yes, to all.

435. (*Chairman.*) I suppose you very rarely suggest any alteration in an examination paper?—Very rarely. When it has happened, it has generally been in consequence of my own insufficient instructions to the examiners.

436. Are the names of the students examined subscribed to the papers which are sent in, or are they indicated by numbers?—Always by numbers.

437. (*The Rev. H. A. Morgan.*) Your work also extends to the dockyard schools?—It does.

438. The number there is very large I suppose?—Yes, the number there is very large.

439. (*Mr. Lingen.*) Take for instance those young gentlemen who are examined at sea twice a year, have you to look over their papers?—They are looked over in my office.

440. You are ultimately responsible for those examination papers?—Yes.

441. And then there are the examinations on board the "Britannia," do you set the papers there?—My responsibility extends to them.

442. And you are responsible for looking over the results?—I am also responsible for the results.

443. Have you any assistance now except that rendered by Mr. Goodwin in that work?—Yes; occasional assistance is rendered by Mr. Smith and Mr. Fowler in the "Britannia" examinations, in the dockyard examinations of January, in the assistant clerkships examinations, and in the cadetships examinations. There are certain periods of the year when, without additional assistance from outside, we could not get through our work. I thought that question would come on a little later, but I may now mention that I propose making a recommendation on that subject to this effect: that, instead of having this occasional assistance, things having now settled down to such a state of equilibrium, I think one additional examiner should be appointed. That, I daresay would, from the Treasury point of view, be a more satisfactory arrangement—to me it certainly would.

444. One obvious remedy would be to relieve you of some papers; for instance, of those of the "Britannia"; it is a pity that your own time, except for purposes of supervision, and being able to judge of the progress of the whole body, should be taken up in looking through such papers as those. And many others of those papers, must be of a class that persons in a wholly different position to yourself, might perfectly well look over, and report to you upon?—Pray do not misunderstand me; I do not attempt to look through the worked papers of the "Britannia" and of the dockyards. I have Mr. Goodwin who is a paid examiner for this work at Greenwich, and I have also the occasional assistance I have referred to. All I do is to exercise a supervision over the work, and to settle points of difficulty which may arise in such examinations.

445. I apprehend that you yourself would read over from time to time a certain number of these papers?—Yes, I read over a certain number. In all those cases which come near the border line of rejection, or of higher certificate, I read the papers as a

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rule, all critical papers have to come through my hands, and in those cases I very often have to read the entire papers myself; but it would be utterly impossible to attempt to read through ordinary papers.

446. (*The Rev. H. A. Morgan.*) Do you yourself arrange the proportion of marks which each of the different subjects shall have allotted to it?—Yes, subject to the approval of the President and the Admiralty.

447. (*Chairman.*) Does Mr. Goodwin report upon all the papers of the cadets on board the "Britannia"?—Yes, assisted, as I said just now, by Mr. Smith generally, and sometimes by another gentleman, Mr. Fowler. But in place of those two gentlemen, I should propose to substitute one permanent assistant examiner.

448. (*The Rev. H. A. Morgan.*) I think Mr. Smith is a naval instructor?—Yes.

449. (*Chairman.*) There must be about 1,000 papers to look over upon each examination of the cadets on board the "Britannia"; there are about 100 boys there, and there used to be about 14 papers set. I do not know whether the number has diminished since; if not, there would be 1,400 papers?—Their number now is about 1,200. I have the numbers here, if you would like to hear them, relative to all the examinations. In the cadetship examination there are 300 papers to look over and there are two examinations annually.

450. You mean in the examination for admission as cadets?—Yes; those examinations occur twice a year, and there are 300 papers each time to look over. In each of the two examinations for assistant clerkships there are 120 papers; in each of the two "Britannia" examinations, 1,200 papers; in the sub-lieutenant examinations the average is 110, and there are 10 a year; in the examination of junior officers afloat, 3,500; in the dockyards in January 2,000 papers; in the dockyards in July 4,000 papers. I need not enter into details respecting the smaller examinations.

451. Does Mr. Goodwin look over all those papers?—Yes, with the assistance I have mentioned just now, and with that of special examiners for French and one or two other subjects; their number is very formidable.

452. (*The Rev. H. A. Morgan.*) How are the gentlemen who look over those papers paid; are they paid by weight, because in Cambridge we pay by weight in the case of those examiners who look over the middle-class examination papers?—The idea is not a bad one for ordinary papers; but our assistant examiners usually receive a fee for the whole work they do.

453. (*Chairman.*) Would it be a relief if you were to delegate any portion of those examinations to the Civil Service Commissioners, should you like to do so or not?—Yes, I have often proposed that all examinations for admission, where you examine candidates from the public or other schools should be in the hands of the Civil Service Commissioners; they might do that work just as well as we do.

454. For admission to the "Britannia"?—Yes.

455. That is hardly a competitive examination now; that might make a difference?—Certainly it is not competitive now. Then the examination for assistant clerkships might be handed over to the Civil Service Commissioners; it is true that that is a small matter comparatively, but I consider that we ought to have nothing to do with it.

456. (*Mr. Lingen.*) Are those clerkships on the Greenwich establishment?—No, for the navy generally.

457. They ultimately become paymasters on board ship?—Yes; such examinations as those of the junior officers afloat could not I think be undertaken with advantage by any one but ourselves, and the dockyard examinations could not be undertaken by anyone but ourselves, nor indeed any of the others.

458. (*Chairman.*) What you have mentioned as suitable to be transferred does not amount to much?—Not to much, it is true.

459. Then the Civil Service Commissioners could not relieve you to any great extent?—Not to any great extent, but they might to some.

460. (*Mr. Lingen.*) Do you find that an examiner who is confined to the examining and looking over of papers retains his freshness; it must be very trying work?—Yes, it is dreadfully trying and tiring work. Unquestionably an examiner's accuracy, quickness, and judgment even will suffer if he be wearied by too many examination papers. I have found that to be so in my own case at all events.

461. (*The Rev. H. A. Morgan.*) Do you not find that you improve by experience?—Certainly; but when examinations come under pressure, as they do with us very frequently, they are excessively wearisome.

462. (*Mr. Lingen.*) Would that have any bearing upon your recommendation that an additional salaried examiner should be appointed; would it be possible to provide for this duty in any degree amongst the instructors of the college, or are they all so completely occupied that they could not undertake any part of the work, for instance the examinations of the "Britannia" with which they have nothing to do?—Our instructors could not partake in the "Britannia" examinations because these come at periods when they are either fully occupied or are absent from Greenwich. In the dockyard examinations of July, three of our instructors are able to give us very important assistance, because there is no hurry for the results, and part of the long vacation can be utilised.

463. (*Chairman.*) That deprives them of their vacation to a certain extent?—That is true, but the vacation is a long one. Moreover, the instructors to whom I refer undertook on their appointment to assist in these examinations during part of the long vacation. For the dockyard examinations in January we cannot make the same provision, because the instructors are all fully occupied at the college.

464. (*Mr. Lingen.*) I suppose those dockyard examinations are of extreme importance?—The one in July at the dockyards is of extreme importance because it is from the dockyards that our students of marine engineering and naval architecture come every October.

465. Have you any personal visits to make except to the dockyard schools?—I always go to the "Britannia" twice a year. Besides supervising the result of the examination here, I usually examine *vivâ voce* the cadets who are passing out. That is my only means of making the personal acquaintance of the cadets, and such an examination gives me supplementary information of much value. I have always been in the habit of examining *vivâ voce* in mathematical subjects.

466. (*Chairman.*) On board the "Britannia"?—Yes. In passing I may observe that I have never seen any traces of nervousness on the part of cadets, which I have not been able to overcome. I know that that was a point to which allusion was made in the report upon the "Britannia," and I have paid much attention to the point. I think I may say that the results of my *vivâ voce* examinations have been advantageous to the cadets as far as their final positions are concerned.

467. (*Mr. Lingen.*) How often have you to visit the dockyard schools?—Once a year at least; to some I go twice. I think they ought all to be inspected twice a year.

468. They are seven in number, are they not?—Five. I have just returned from visiting them.

469. (*The Rev. H. A. Morgan.*) You say you inspect them; do you give a *vivâ voce* examination there?—When I inspect them I generally give a *vivâ voce* examination, but that is chiefly for the purpose of making the acquaintance of the students, and occasionally of directing the attention of the schoolmasters to certain deficiencies; such examinations have no effect upon the position of the students.

470. (*Mr. Lingen.*) About what time do you pass at the "Britannia," more than one day?—Generally two or three days.

471. And at each dockyard school?—At each dockyard school I generally spend one day.

472. Do you find it a very serious addition to your other labours?—I find it certainly an addition to my other labours though the change of work has not been disagreeable.

473. Have you any suggestion to make with reference to those personal visits?—The work which was transferred to the college from the Director of Education, Dr. Woolley, constitutes an immense addition to my duties at Greenwich, at least half my time is absorbed by it, and it is work which I never contemplated having to do. It is quite true that I recommended with Admiral Sir Cooper Key (we felt bound in the interests of the service to do so) that the direction of the studies and examinations in these affiliated schools should proceed from the authorities at Greenwich, because it is from them that the college is fed. That we should keep an eye upon the instruction which is being given in those outside schools is a point in my opinion of the highest importance. After three and a half years' experience, however, broken health warns me that in future I must attempt less. In particular I must ask to be relieved of all details connected with examinations, other than those which officers actually studying at the college have to pass. The responsibilities from which I desire to be relieved, Mr. Goodwin is in every sense qualified to assume. To that end, however, he will require the permanent assistance I have already alluded to.

474. More of a deputy in certain cases you think he might be than merely an assistant?—Yes, he might be the responsible examiner for the outside schools, with an assistant under him. In this manner we should in the first place not require occasional assistance so frequently, and besides this Mr. Goodwin would be able to take part of the work which I have hitherto undertaken.

475. (*The Rev. H. A. Morgan.*) Mr. Goodwin is regularly on the staff of the Greenwich College, I think?—As examiner but not as teacher.

476. He examines for the "Britannia," does he not?—Yes, he takes a prominent part in these examinations.

477. Then, in fact, the cost of examining for the "Britannia" falls, in one sense, upon the staff of Greenwich College?—Yes, in one sense, it does.

478. And the cost of examining the dockyard schools also falls upon the staff of Greenwich College?—Yes, in the same sense.

479. (*Mr. Lingen.*) We should be very glad if, in addition to your other evidence, you would kindly put on paper any specific propositions which you desire to have considered for the relief of your own branch of the college administration, whether in the inspection of those schools or in the revision of papers.—I shall be very glad to do so. Mr. Loveless points out that it might give rise to some misapprehension, if I were not to qualify what I said as to Mr. Goodwin's being paid out of the college funds. College funds are usually understood to be devoted to instruction in the college. There are, in fact, several heads in our estimates; one is for the instruction at the Royal Naval College, and another is for the conduct of examinations at the Royal Naval College or elsewhere by the examining staff.

480. (*The Rev. H. A. Morgan.*) When you were appointed, did you understand that you were to undertake all this work?—No, my appointment was simply as Director of Studies in the college.

481. I suppose on the whole you prefer having all this work in your own hands if you have proper assistance for it, it being all connected together?—I should not object to act as adviser or referee, with respect to the courses of instruction to be followed in the schools connected with the college, if it were desired, and also with respect to the regulations under which the examination of officers and students, who ultimately come to the college, are conducted.

482. It is better for the education generally that it should be under one head?—I have always been of that opinion.

483. (*Chairman.*) Who conducts the examination of the acting sub-lieutenants? That is a very important examination, since, amongst other things, it determines whether an officer is to remain in the navy or not?—As regards the mathematical part of it, the papers are set, under my supervision, by Mr. Goodwin, and that is the case also with the papers on navigation and nautical astronomy, and on meteorology. Professor Rücker, whom I have already mentioned, examines in physics.

484. Is he on the staff?—No, he is outside; he is a professor at Leeds; he also examines at the college in June; he has undertaken all our examinations in physics, in fact, for a fee of 85*l*. Professor Cassal examines the sub-lieutenants in French, and Mr. Hearson examines them in steam. He is on the college staff, but he never comes into contact with the sub-lieutenants; he examines in steam because, as an engineer in the navy, and Fellow of the late School of Marine Engineering at South Kensington, he is intimately acquainted with the subject as taught to the sub-lieutenants. Staff-Commander Harris at the Admiralty examines in marine surveying and the use of instruments. Those constitute the examiners for the sub-lieutenants.

485. How many examinations are there in the year of acting sub-lieutenants?—They amount on the average to 10, if I remember rightly.

486. There is one nearly every month, in fact more than one a month during the session?—Yes.

487. This examination of sub-lieutenants occurs irregularly, does it not; that is to say, there are no fixed times for it?—Not very irregularly; there is on the average an examination once a month. We endeavour to make it as regular as possible. We are sometimes in advance of the exact date by a week, and sometimes in arrear by a week.

488. Those examinations being so frequent, must it not happen that the same questions recur constantly?—They do. That is a point to which I frequently have to look. That they should recur is unavoidable; but inasmuch as it is impossible for any such recurrence to be anticipated by the candidate himself, I do not see that it has any injurious effect upon the entirety or thoroughness of the examination.

489. It does not often happen that these acting sub-lieutenants are assisted by crammers, does it? Because crammers you know get up all the questions and know the periods, if I may so say, at which the questions will be likely to recur.—The business of an examiner is to thwart the crammers amongst other things. Many of the sub-lieutenants have private tutors outside, and no doubt those private tutors study the questions which have been set in previous examinations very closely. For my own part, however, I find it very easy to detect cramming in mathematical subjects. You cannot well cram a student to solve a question properly which he does not understand.

490. (*The Rev. H. A. Morgan.*) That is quite hopeless, it cannot be done; because the least change in the wording of a problem at once throws him out?—Yes.

491. (*Chairman.*) This examination of the sub-lieutenants is conducted by inside examiners you say, not by outside examiners?—Examiners of both kinds take part in it; for instance, Professor Cassal could not be properly called an inside examiner, although he is our Professor of French. And in the case of Mr. Goodwin, although he is on the college staff, he is on the examining staff solely. Mr. Hearson is on our teaching staff, but he does not teach sub-lieutenants. Professor Rücker and Staff-Commander Harris are not on our staff at all.

492. (*Mr. Lingen.*) The "Final Examination" only refers to half-pay officers and those who are going through the three years course?—Yes; and it takes place at the end of June.

493. It excludes the acting sub-lieutenants?—Yes.

494. (*Chairman.*) It sometimes happens that a lieutenant fails in his examination, and then he is examined again in a month's time. Have you noticed

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whether men can really improve very much in a month?—I have frequently known an officer to succeed the second time. Sometimes it is because he had not made all the effort that he might have done on the first occasion. I do not suppose that in one month he can get very much additional knowledge; but if he has succeeded tolerably well in, we will say, eight or nine subjects, he may turn his special attention to the remaining ones during that month, acquire more aptitude in them, and thus obtain sufficient marks to lift him over the line of failure.

495. Must he pass in all those subjects of which there are 11, or must he simply get a certain aggregate number?—He must simply get an aggregate.

496. Is he obliged to take them all up?—There is no regulation binding him to do so.

497. Is there any one of those various subjects in which sub-lieutenants are examined in which they must necessarily pass?—No; not as the regulations now stand. If a sub-lieutenant obtain 750 marks in the aggregate he passes; but as a matter of fact I never knew any subject to be entirely omitted.

498. Take trigonometry. It is possible that a man might do well in algebra, and well in geometry, but yet that he might entirely fail in trigonometry; would he pass in that case?—No. Without a fair knowledge of trigonometry he could not obtain the necessary aggregate of marks.

499. (*The Rev. H. A. Morgan.*) What proportion of the marks is required to pass a candidate?—750.

500. (*Chairman.*) That is half, is it not?—Yes.

501. Then this examination, although it is not entirely conducted by outsiders, is conducted entirely by those who have not had any share in the instruction of the candidates who are examined?—Entirely and strictly.

502. You kindly looked over the papers which were set in the "Britannia" in 1873, and compared them with these examination papers, and I believe you do not think that there is much difference where the subjects are common to both?—Very little.

503. They passed those examinations when they were 15 years of age?—Yes.

504. Of course some subjects you expect men to forget at sea, and they have to pick them up again afterwards?—Yes.

505. Others of course they must learn at sea more or less?—Yes; and now with the system of examination at sea twice a year, they are not likely to forget the subjects to a great extent.

506. (*Mr. Lingen.*) Some of the higher professors of the college are not employed in the instruction of the acting sub-lieutenants, and they are therefore free for their examination. Is that the mode in which you secure, with an in-college examination, that the examiners shall be independent of instruction?—Yes; Mr. Hearson, for instance, is the assistant to Professor Cotterill, and, as such, comes only in contact with engineers and naval architects. Professor Cassal's appointment is to give instruction for two hours twice a week in French to the voluntary students of the college. He never comes in contact with the sub-lieutenants. Staff-commander Harris is not on our staff. Mr. Goodwin never instructs at all, and never comes in contact with the sub-lieutenants except at examinations.

507. And no acting sub-lieutenant of exceptional ability or of great aptitude for any special subject, such as those which these gentlemen teach, would fall under their instruction in the course of his six months, because his six months are entirely taken up with definite subjects which he must attend to?—Yes; we never allow a sub-lieutenant to attend one of the classes specially adapted to voluntary students.

508. (*Chairman.*) We are asked our opinion as to what the remuneration of the instructors should be, which rather suggests the idea that there is not entire satisfaction on that subject; we should therefore be very glad to hear what you have to say about it?—With respect to the general rate of payment of the professors and instructors of the college, I do not

propose to say anything, at the present time, further than that, in a growing establishment like ours, which is becoming more and more important, I think, every day, we may naturally look for an augmentation of the salaries in due time. I would rather confine myself at present to drawing your attention to an anomaly and to one or two insufficiencies, leaving the question as to the general scale of payment entirely untouched at present. The anomaly, if I may so call it, is presented in the actual position of Mr. Lambert, one of our mathematical professors; he has the title of assistant professor of mathematics, and he receives a salary of 500*l.*

509. (*Mr. Lingen.*) Has he a residence?—No, no residence. I have to observe with respect to him that the term "assistant professor" is really without meaning, and is invidious, inasmuch as he assists nobody; that is to say, no other higher professor. He has a perfectly independent position, in so far that his classes and lectures are, under my superintendence, entirely matters of his own arrangement. He therefore is a professor, and not an assistant professor in the proper sense of the term. I recommend that he be so styled and further that he be put on a footing of perfect equality with the other professors; I do so on the ground, that he is an admirable professor, one of the best I ever knew, in fact,—and that to retain him, I consider, is a matter of the highest importance to the college; let me add that I deem his salary of 500*l.* to be insufficient. I strongly recommend, therefore, in Mr. Lambert's case, that his title be altered to Professor, and that his salary be raised to 600*l.*, to be equal with the other professors.

510. About what is his age?—I could not say, but as to university standing he is of the same year as Professor Miller.

511. The chances are that he is a man of about 33?—Somewhere about that.

512. How came that title of assistant to be annexed to his position?—The story is rather a long one, but briefly I may say it is this: when it was seen that the director of studies would not have time to give many, if indeed any, lectures in mathematics, as was originally contemplated, the appointment of an assistant professor of mathematics was decided upon; the first thought being that this professor should have charge of some part of the mathematical instruction, immediately under the director of studies.

513. That he was to be assistant to yourself, in fact?—Exactly so. Subsequently, it was seen that regular mathematical instruction was out of the question, so far as I was concerned.

514. You are probably aware that the title of assistant survives in many branches of the public service; that originally they were *censé* to be assistant to somebody or other, and the title of assistant still attaches to many independent offices?—Yes, but in the present case there are objections to its survival; it was afterwards seen that the mathematical instruction of the college naturally divided itself into two distinct branches,—that given to the engineers and naval architects, and that given to the executive officers generally; and seeing that there is no contact between these students, it was thought better, under my supervision, to give the charge of the mathematical instruction of the engineers and naval architects to the professor of mathematics proper, and the other to Mr. Lambert. From that moment, however, the title of "assistant" became inappropriate and objectionable.

515. (*The Rev. H. A. Morgan.*) In what respect do the titles of Professor Miller and Professor Lambert differ? I do not mean as to the title of assistant, but in what respect does the nature of the studies that they have to superintend differ?—In nothing, except, perhaps, as to extent of reading; but this, for voluntary students, may and no doubt will increase. They are both professors of mathematics in the proper sense of the term; the one is in charge of the mathematics suited to engineers and naval architects, and the other of that suited to the executive officers.

516. (*Chairman.*) Have any of the professors made any claim for higher salaries, or have they expressed dissatisfaction?—Professor Lambert has unquestionably expressed dissatisfaction with his title, and also a desire to have an increased salary.

517. Would he be satisfied if he was on the same footing as the other professor, Professor Miller?—I believe so, fully.

518. Professor Miller has not made any claim, has he, for a higher salary?—No formal claim, but in conversation Professor Miller has undoubtedly mentioned the matter to me.

519. (*The Rev. H. A. Morgan.*) An increase from 500*l.* to 600*l.* a year is certainly not too much for men like Professors Lambert and Miller?—Certainly not.

520. (*Mr. Lingén.*) How much of their time should you say was occupied by their college duties?—First of all, they give three hours attendance every day—that is all that we actually claim; but, as you know, every good professor and instructor must devote a great deal of extra time to preparation, and so forth.

521. I presume the three hours means that he is actually *en évidence* for that time before his class?—Yes; I submit that we demand from the distinguished men who hold our professorships quite as much time as we can reasonably expect from them considering the rate at which they are paid.

522. (*Chairman.*) Have they to look over the papers that the men do day by day, out of those three hours?—Some of them do.

523. Do they carry the papers home and look over them, if necessary?—I know that some do. Professor Lambert frequently does.

524. (*The Rev. H. A. Morgan.*) Should you say that their daily lectures require a considerable amount of preparation?—I should say they do; that they have required preparation up to this time is undoubtedly a fact, but of course the work becomes somewhat easier as time goes on; but every good lecturer, before he gives his lecture, is in the habit of devoting more or less time to the subject, in order to refresh his memory.

525. Do you say that both Mr. Miller and Mr. Lambert have to be at Greenwich three hours every day?—Yes, they have to be there 18 hours a week. I should be very willing indeed to support any well matured proposition to give gradually increasing salaries to our professors. Considering their position, and considering the time that they devote to us, I think that the question may be very fairly entertained.

526. (*Chairman.*) At the same time I think you say that neither of those two gentlemen has complained to you of the salary being insufficient?—Professor Lambert has represented that his should be raised to 600*l.*

527. But Professor Miller has not advanced any claim for further salary?—Not formally.

528. But from what you have heard him say you have no doubt that he would be glad to get it?—Exactly so, and I should be very glad to support in his case, a proposition of the kind already alluded to.

529. How much time does the professor of physics give to his duties?—The professor of physics lectures twice a week. That involves devoting the whole of the morning, at least, of the lecture, to preparation for it; more than this must be often involved.

530. What does physics include?—Heat, electricity, magnetism, light and sound. The professor of physics has, further, classes of practical instruction in physics on four afternoons in the week. He has moreover the superintendence of the instruction given in physics to the sub-lieutenants on one afternoon in the week; he takes part in it, in fact, which is quite exceptional for a professor.

531. Has he any assistant?—He has; he has the assistance of Mr. Haddon, who is called a demonstrator, for his lectures, and he has further the assistance of Mr. Waghorn for his practical instruction. Mr. Waghorn takes a prominent part in the instruction of sub-lieutenants in physics.

532. Then he has a demonstrator in physics; who is the other gentleman who gives this instruction?—Mr. Waghorn; his title is assistant to the professor of physics; he has to assist in the practical instruction to the voluntary students, and he has also to assist in the lectures, and the instruction given to the sub-lieutenants. He has moreover to look at the answers to the questions that have been proposed by the professor, to the voluntary students of the college; for, as far as possible, I try to carry out that system in the college, that is to say, after each lecture to follow it up by questions on the subject of the lecture, the answers to which shall be written, if possible, in presence of the professor, and if not, shall be sent in by the students for the purpose of being examined carefully by him, or by one of his assistants. With the subject of physics this latter mode is the only one that we can follow; in mathematics the individual instruction follows immediately after the lecture and under the supervision of the instructors, but in such subjects as physics this cannot well be done, and, therefore, the questions are given them at the end of every lecture, and the answers are written by the students; those answers being sent in and examined, and commented upon by the professor and his assistants.

533. (*Mr. Lingén.*) Are the answers by the students of physics written in their own rooms immediately after the lecture?—Sometimes in their own rooms; sometimes also in the college during hours devoted to optional study.

534. (*Chairman.*) Is the salary of the professor of physics 600*l.* a year?—Yes, that is the salary of all the professors.

535. The demonstrator in physics has 150*l.*, and the assistant to the professor 284*l.*; the assistant to the professor is a naval officer, is he not?—He is an engineer.

536. He is borne on the books of Her Majesty's ship "Fisgard," and receives full pay and allowances?—Yes.

537. Is that 284*l.* additional to his full pay?—No, the addition is not so much as that; he has 9*s.* a day full pay and 120*l.* for his salary.

538. Has the professor of physics ever complained that his salary is insufficient?—No.

539. (*The Rev. H. A. Morgan.*) Who is the professor of applied mechanics?—Professor Cotterill.

540. Do you consider it desirable to have as eminent a man as professor of applied mechanics as professor of mathematics?—I do; in point of eminence I would draw no distinction between the two.

541. Do you require as eminent a mathematician for applied mechanics as for the other branch?—The subject of applied mechanics is becoming daily more and more important; it is, moreover, susceptible of the highest applications of mathematics, so that I should not venture to draw any distinction whatever as to standing or mathematical ability.

542. For the subject, as taught in Greenwich, you wish to have as able a man as possible for the professor of applied mechanics?—I do, decidedly.

543. The degree that a man takes at the university does not determine the salary, but the nature of the office?—Yes, we must look to something beyond the degree in our estimate of salaries and positions. Professor Cotterill, after having taken his degree, devoted to this subject of applied mechanics long years of study, and he is now regarded as one of the highest authorities in England on this special subject. Therefore we must not, in taking account of his position at a college like Greenwich, merely consider his previous academical distinctions.

544. (*Mr. Lingén.*) With regard to the question of salaries, in which the Treasury comes in, we must mainly consider, must we not, the demands of the office, independently of a person's degree or no degree?—Quite so.

545. (*Chairman.*) Do you think that the circumstance of Greenwich being so near London and, one may say, almost in the heart of London society, makes

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those positions more valuable to the gentlemen who occupy them?—I should scarcely think so.

546. Do you think that they would go away from London to a remote part of the country for the same salary?—I think they possibly would.

547. Do you think that any one of them would be tempted to go to one of the Queen's Colleges in Ireland for a slight advance of salary?—I do not think it at all improbable.

548. (*The Rev. H. A. Morgan.*) Would you approve of a scheme of this kind, that the salaries of those gentlemen should increase slowly and gradually?—I do approve of the general principle of an increasing salary; but I am not prepared to give a fuller answer to your question as it refers specially to our professorships.

549. No doubt you might get those first-rate men to remain with you if they could look forward to having such an income as 800*l.* or 1,000*l.* a year eventually?—Just so.

550. You think it very desirable that they should be retained if possible when you do get first-rate men, because, after what you say, to lose men like Professor Miller and Professor Lambert would be a serious loss to the college, and it would be better to retain them with a larger salary than to appoint younger men?—Yes, certainly; the general principle of increasing salaries I think is a good one; but I confess that, in its relation to our professorships, I have not given the question distinct thought.

551. (*Chairman.*) The Committee would be glad to hear any opinions that you entertain as to any of those professors in particular; but probably it is scarcely worth while to go through all of them in detail, unless you think it desirable?—To conclude with Professor Lambert, I may also state that this increase of salary of which I have spoken, and the alteration of title, were virtually agreed to by the Admiralty, and received the provisional sanction, I think, of the Treasury; they should have taken place at the beginning of the present financial year, had not the appointment of this Committee intervened. I should like to add that I hope the payment of his increased salary will be dated from the time at which it was originally agreed to by the Admiralty, that is to say, from the beginning of this year. The next salaries which I wish to mention are those of the three instructors, Mr. Pole, Mr. Gleed, and Mr. Solomon. Mr. Pole is assistant to Professor Miller, and he also has sole charge of that class of probationary lieutenants in the Royal Marine Artillery of which I spoke the last time I was examined. Mr. Gleed is assistant to Professor Lambert, having been promoted to his present position from being assistant to Mr. Laughton in the lower division in mathematics. Mr. Solomon is the last appointed assistant instructor; he fills the vacancy caused by Mr. Gleed's taking the higher position, Mr. Henry having previously left. With regard to those three instructors in mathematics, I proposed some time ago that Mr. Pole's salary should be raised to 275*l.* from 225*l.* I proposed that Mr. Gleed's salary should be raised to 250*l.* from 225*l.*, and that Mr. Solomon should enter upon his duties at a salary of 225*l.* Mr. Solomon is, provisionally, in receipt of his salary; but the Admiralty postponed further action until they should be advised by this Committee. I strongly advise that the distribution should be that I have mentioned. Mr. Pole has been the longest with us, and, as I stated, is not only assistant to Professor Miller, but he has in his own charge the conduct of a class of probationary lieutenants in the Royal Marine Artillery. I consider 225*l.* to be too small a salary for him, and that he should have 275*l.*, with the prospect of an increase up to 300*l.* Mr. Gleed, having become Professor Lambert's assistant for the higher division of executive officers, is, I consider, fully entitled to a salary of 250*l.* with the prospect of a gradual increase up to the same limit. Mr. Solomon's present salary will suffice, perhaps, for some time longer.

552. I think that the salary of one of the three instructors in mathematics is put down at 300*l.*?—That must either be a mistake, or it must refer to the time when Mr. Henry was still with us. I may mention that originally those two assistants of Professor Lambert and Professor Miller had 300*l.* a year each. Subsequently it was found that we must have an assistant for Mr. Laughton, but we did not require his whole time; consequently he entered upon a small salary, I think, of 150*l.* It was Mr. Pole who so entered. After some time Dr. Wormell, who held the position of assistant to Professor Miller, left us, and consequently 300*l.* fell in for re-distribution. Finally, Mr. Henry also left us, so that the remaining 300*l.* fell in for re-distribution; making, with the 150*l.* first mentioned, a total of 750*l.* available for re-distribution amongst the three instructors. This is the re-distribution I advocate:—275*l.* to Mr. Pole, 250*l.* to Mr. Gleed, and 225*l.* to Mr. Solomon. The next on my list are the two demonstrators; Mr. Wills, the demonstrator in chemistry, and Mr. Haddon, the demonstrator in physics, who at present receive salaries of 150*l.* each. The Admiralty approved of those salaries being raised to 175*l.*; the proposition has not been carried out, but is waiting the decision of this Committee. I strongly recommend that it should be carried out. Provision was made for its being so in the estimates. I may mention that we ought, I think, to look to the salaries of those two gentlemen increasing up to a maximum of 200*l.*

553. (*Mr. Lingen.*) In these observations do you bear in mind what similar persons would get in the employment of the great hospitals, or in any of the non-government institutions in which scientific labour is employed?—I do. These two gentlemen could command those salaries in institutions where they would have similar work to do. They have proved themselves to be competent men, and we might retain them if there were a prospect of their salaries increasing to some extent. I do not propose that they should increase beyond 200*l.*, because those positions of demonstrators, I take it, ought to be held by promising young chemists and physicists, who look to better positions elsewhere; their having held the appointment of demonstrator at Greenwich should be of assistance to them in obtaining such higher positions.

554. Access to perfect laboratories and occasional assistance from the professors, or at any rate occasional advice, you think most important to them?—Just so; the fact of their having been at the college as assistants to those professors must be of assistance to them in after life. Still 200*l.* a year for men in their position, is not a large sum. They may fairly look to receiving such a salary in the end.

555. (*The Rev. H. A. Morgan.*) Do they receive rations or rooms?—No.

556. (*Chairman.*) Have they not a good deal of time which they may employ in other ways?—Not much.

557. Are they bound to live at Greenwich?—No, they are not bound to live at Greenwich at all; they are simply bound to be in attendance between nine and five daily; they are liable to be called upon to be in attendance during those hours, and if they do not actually attend it is by the express permission of the professors.

558. Have the assistants any opportunities of increasing their incomes? might they give lectures on an evening or anything of that sort?—Certainly; I should not oppose their doing so.

559. You would not object if you heard of their doing so?—Certainly not. I think we ought rather to encourage their doing so. I have no doubt that they do a little literary work in the evening. We cannot possibly ask a man who receives only 150*l.* a year to abstain from undertaking additional work.

560. Are there any other members of the staff with regard to whom you have any remark to make?—Mr. Canter is engineer in charge of the "Arrow," and also does the duties of assistant to the instructor

in steam at the college. Mr. Canter at present has nothing beyond his full pay and a trivial allowance of a shilling a day, or something of that kind, for the charge of engines.

561. What is Mr. Canter's title?—He is engineer in charge of the "Arrow," which is one of the vessels that we employ for going down the river on surveying expeditions, and he is also assistant to the instructor in steam. Mr. Canter has simply his full pay of 10s. a day. He has given a good deal of instruction at the college, especially lately; he has given extra instruction to our sub-lieutenants in order to enable them to pass their examinations. He has been of very great service to us, and there will continue to be opportunities for his assisting us in the same way. I should strongly recommend that some addition to his full pay be given him. Of course it should be less than that which is given to such instructors as Mr. Waghorn and Mr. Hearson, who are also engineers, because his duties are not of so important a character at the college; he is merely assistant instructor, but still I think he is entitled to an addition to his ordinary salary, amounting at least to 50*l.* a year. I think this completes the list of those on the teaching staff of the college whose positions might with advantage be improved at once.

562. Do you find any difficulty in obtaining instructors in French and German at the present rate of payment?—No. We have been extremely fortunate in retaining the services of Professor Cassal for two hours on two afternoons in the week.

563. I presume he is a gentleman who may, if he likes, give instruction elsewhere?—Yes; we could in no way interfere with his doing so so. The terms of his agreement are, that he attend at the college on two afternoons in the week for two hours each time, and for those four hours attendance a week he is paid a salary; we have no claim on any other portion of his time.

564. (*The Rev. H. A. Morgan.*) Is he a teacher of French generally?—He is professor of French in University College, London; probably one of the ablest teachers of, and examiners in French in England at the present time. He is also one of our external examiners, and it is because we have only a claim on his teaching time for four hours a week that I consider him to be in a position to hold such an examinership.

565. (*Mr. Lingen.*) I suppose his instruction with reference to those officers who are already possessed of a tolerably competent knowledge of French is of a very valuable literary order?—Very; he lectures in French part of the time during which he attends at the college. His teaching is highly appreciated at Greenwich.

566. (*The Rev. H. A. Morgan.*) Do you consider that the instructing staff in French is sufficient, seeing that there are more than 120 students who receive instruction in French?—We have not so many now; moreover, a second instructor, Mr. Penon, devotes his whole time to us. When I say that he devotes his whole time to us, I mean that we can ask him to give us any reasonable number of attendances, due regard being had to his strength. A year ago I applied for temporary extra assistance for the instruction in French, because our classes were too large. The sub-lieutenants were very numerous then, and their instruction in French had to be provided for as well as that of the voluntary students, the probationary lieutenants, and the students of engineering and naval architecture in the second and third years. I found that our two instructors were not sufficient for the work, because, of course, Professor Cassal's appointment being for four hours a week, I could not ask him for more time. My application was not granted, however, and the consequence was, I fear, that the instruction deteriorated in quality. Happily, in one sense, the number of sub-lieutenants has much diminished, and at present our means for giving instruction in French are adequate, as I stated on the last occasion.

567. (*Chairman.*) Therefore, if sufficient in French, we may assume that it is the same with regard to German and Spanish?—Yes; but I trust that in the event of our numbers increasing again it will be understood that our two instructors in French now are working to the maximum of their power.

568. (*The Rev. H. A. Morgan.*) To what do you attribute the decrease in the number of those acting sub-lieutenants?—Chiefly to the number of entries five or six years ago.

569. (*Chairman.*) Has the scale of payment for the examiners been generally found satisfactory, whichever they may be, whether inside or outside?—Generally, I may say that it has given satisfaction. Mr. Niven, for instance, who examines in mathematics, considers his payment fair and reasonable. He examined solely at one time, and he obtained a fee of 100*l.*, but at his own suggestion the examination was divided between himself and Mr. Taylor, so that the results could be sent in more quickly. Mr. Niven, himself, proposed that there should be two examiners, and that the fee should be divided equally between them. Speaking of outside examiners, I said that I had no complaints from those who examine at the college once a year; I ought to have said no complaints except from the examiner in French, M. Karcher. His fee is 15*l.*, but he has represented on two occasions, and I think justly so, that it is insufficient, considering the number of students that he has to examine. He has to set the papers, and he has to look over perhaps 100 answers; he has, further, to attend at the college to conduct *vivâ voce* examinations. Taking all this into account, I think that the fee of 15*l.* is too small, and I should be glad to recommend that it be increased to 20*l.* at least.

570. Has he 15*l.* for each examination?—Yes.

571. How many are there in the year?—One a year.

572. How many days does the examination take him?—He has one day's attendance at the college, but in the preparation of the papers of questions, and in looking over and reporting upon the answers, several more days must be occupied. I think that from 20*l.* to 25*l.* would not be too large a fee, considering the number he examines.

573. (*The Rev. H. A. Morgan.*) What does the examiner in German get?—He gets 10*l.*, but it is a much smaller examination; the number to be examined is much smaller; and the examiner in Spanish has fewer still; he only receives 5*l.* Of course in these fees there is no proportion observable, because if the examination be small, beyond a certain limit, the fee cannot be diminished accordingly.

574. (*Mr. Lingen.*) You would recommend an obligatory minimum?—Yes. So much for the fees for the outside examiners at the final college examination. With respect to the fees for the other examiners, for outside college work, I have nothing whatever to say on the question of sufficiency. I have merely to repeat what I said this morning, that I think by having a paid examiner instead of two occasional examiners, we may not only economise but render the examining staff more compact and efficient. For instance, our examiner in French, Professor Cassal, conducts the examinations of the sub-lieutenants in French, as well as the examinations for assistant clerkships, and the examinations for cadetships; he also examines in French on board the "Britannia," twice a year. For conducting each of these examinations he has a special fee. Those fees are estimated in various ways; in the case of the sub-lieutenants, for instance, he is paid at so much a head, with a certain minimum; in other cases he is paid a lump sum. I am inclined to think that it would be more satisfactory to Professor Cassal and to ourselves if he were paid a fixed sum annually for conducting those examinations. We have found this mode of payment to answer very well in the case of the professor of physics, whom I mentioned some time ago. He examines in physics, not only for the college, but also for the "Britannia," for the dockyards, for

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clerkships and for sub-lieutenants. Formerly a special fee was paid for each of those examinations, but according to a recent order Professor Rücker receives 85*l.* for conducting all examinations. Since all these recur periodically, the present arrangement is much simpler. I think that if some similar arrangement were made with regard to French, a decided advantage would be gained. As regards occasional examinations, such as those for interpreterships in French, and other languages, the practice of giving special fees must, of course, be continued.

575. How many examinations in the whole course of the year would Professor Cassal be engaged in?—The examinations for assistant clerkships, and for naval cadetships each occur twice a year; that would be four examinations. Then there are the “*Britannia*” examinations twice a year, and the sub-lieutenants examinations, of which there are ten annually. Altogether, therefore, there are 16. Those are the only fixed examinations. As to the interpreterships, we cannot tell how many examinations there will be.

576. Do you know what his fees amount to now for the whole year?—I cannot say from memory; the modes of payment being so very different. But exact information on the point will be supplied.

577. Should you recommend the same examiner being kept year after year, or would you have a change?—I would make no condition at all in that respect. It is better to reserve the power of changing the examiner occasionally, undoubtedly; but for the last three years Professor Cassal has been our examiner, and no one could have done our work more thoroughly. I could recommend no change at present.

578. (*Chairman.*) Are you aware that for the Civil Service of India they vary from year to year, and that no examiner is appointed for more than one year?—Yes; but at the University of London, examiners are changed only once every four years, I believe.

579. You do not think it would be a good thing, as they do in the University of London, to advertise for examiners?—I think not, as a general rule. I think that the element of judgment should enter largely in all cases with which we have to deal; when, from personal knowledge, a thoroughly good examiner is known to us, we should have the opportunity of recommending his employment for examinations such as ours. But, of course, the responsibility of the director of studies is great in all such cases.

580. (*The Rev. H. A. Morgan.*) Do not you find that the examiners get into a groove when they have examined for several years, and that the men become so familiar with their papers that they have a good notion as to what questions they will set?—No doubt that is the case, more or less, with all examiners.

581. You are probably aware that they seldom appoint examiners at Cambridge for more than two consecutive examinations?—I am aware of that. For the examinations that we have to conduct, however, a change of examiners is not of so much importance; frequent change, indeed, would be undesirable. Our examiners are, as a rule, instructed to examine in very well defined subjects; each examination is adapted, as it were, to the instruction that has been actually given. Our examinations are not, as a rule, of the character of those which are attended by candidates proceeding from different places of education; the peculiarities of the examiner may then be all important; with us they are of little or no importance at all. He has, in fact, next to no scope for originality in our examinations.

582. (*Chairman.*) Then on the whole the payment of the examiners seems to you to be on a satisfactory basis, and not to require any changes beyond those which you have mentioned?—I think not. The only other change that I have to recommend has been touched upon already, namely, the appointment not only of an examiner who shall take all the examinations in French for a certain fee, but also of an examiner, under Mr. Goodwin, in the place of those occasional examiners that we are now allowed to call in. With respect to Mr. Goodwin's own remuneration, I ought perhaps to mention that he is

labouring under some disadvantages. He has a salary at present of about 400*l.*, which sum has been made up by his full pay as naval instructor, and by certain allowances for lodgings, and by what is called tuition money; this tuition money amounts, in Mr. Goodwin's case, to only 60*l.* a year, whereas in the case of all our instructors in the college (we have three naval instructors for the sub-lieutenants) their tuition money, I believe, is at the rate of 100*l.* at least.

583. What is tuition money?—It is properly speaking a compensation for tuition money. Naval instructors would have, if they were actually on board, a certain fee for each officer or midshipman they instructed,—5*l.* a head, or something of that kind,—but when they are not at sea, when they occupy positions on shore such as our instructors do, they are cut off from this source of revenue; and there is a certain allowance made, which is called tuition money. In the case of the three instructors at the college, they have at least 100*l.* a year for tuition money, and in the case of the naval instructors in the “*Britannia*,” which is another case in point, at least 125*l.* in lieu of tuition money is given. But Mr. Goodwin, for some reason or other, which I do not understand, has only 60*l.* I think he should have the same allowance that the other instructors at our college have. This, however, would be merely in rectification of what I conceive to have been an oversight so far as his salary is concerned; of course it would be merged in a larger question. If he were to assume more responsibility with regard to our external examinations, as I am strongly inclined to recommend that he should do; then his salary ought to be increased by a greater amount; to what amount I am not prepared to say at the present moment.

584. (*Mr. Lingen.*) At present your naval instructor remains on the navy establishment, and might go to sea at any moment?—Yes.

585. Should you advise that he remained in his position, or that he was made specifically an officer of the college establishment?—I should recommend his remaining as naval instructor (his full pay going on increasing, as every naval instructor's pay does), but that an addition should be made to his pay for services rendered as deputy examiner. Such an addition for special services has been made in the case of Mr. Loughton, in the case of Mr. Oborn, and in the case of Mr. Davies; they all have allowances in addition to their pay as naval instructors.

586. I suppose the object in appointing naval instructors to those situations was that they would be more easily removed and sent back to their service if for any reason their removal was thought desirable?—Not only so, but they are always good authorities in the subject of navigation and nautical astronomy, which is one of our most important subjects; you could scarcely find a competent instructor and examiner in this subject outside the navy.

I think that is all I have to mention with respect to insufficiencies in the salaries of the examiners. I might, perhaps, be allowed to inquire whether this additional matter would come under your consideration: I have also in my department at Greenwich two clerks, or rather one clerk and one writer. One is a senior clerk, but with respect to his salary I have nothing whatever to say; it is sufficient, I daresay, and goes on increasing at the ordinary rate; but with respect to the salary of the writer, Mr. Buller,—who acts as my clerk for matters of correspondence connected with the college,—for drawing up college programmes, and for many other matters that writers are not accustomed to at all, and that an ordinary writer would not be able to do,—I should be very glad to see some substantial acknowledgment made for the many trustworthy and responsible duties which he has to perform.

587. (*Chairman.*) It would seem that there are two senior clerks receiving from 400*l.* to 600*l.*, and one clerk from 100*l.* to 400*l.*; is he the clerk who is put down as receiving the latter amount?—That

would be Mr. Cherry, probably; not the one I mean. Mr. Buller would be called, technically, a writer.

588. (*Mr. Lingen.*) What salary is he receiving at the present time?—His salary has now risen to 150*l*. He has thoroughly learned his duties at Greenwich, which are of a very special kind, and I have frequently to put him in positions of great trust and of considerable responsibility. The duties which he has to discharge are, as I said, far beyond those which come under the ordinary duties of a writer. I should strongly recommend, therefore, that this additional responsibility be recognised by an additional salary. I believe that it is now in contemplation to put him in the position of a clerk, but in what state that question is at this precise moment I am not able to say. He has

performed his duties exceedingly well so far, and I strongly recommend that a special allowance be granted for the special kind of duty which he is called upon to do at Greenwich.

I would also strongly recommend that the superannuation of Professor Cotterill, who was formerly vice principal of the school of naval architecture at South Kensington, and professor of applied mechanics, should be re-considered, with the view of his counting the time which he served at South Kensington in addition to that served in Greenwich. I have already had occasion to refer to the valuable services rendered by Professor Cotterill, and to the importance, from a naval point of view, of the subject he has specially studied.

The witness withdrew.

Adjourned to Saturday next.

At No. 1, New Street, Spring Gardens, Saturday, 18th November 1876.

PRESENT :

THE REVEREND O. GORDON, B.D., IN THE CHAIR.

The REVEREND H. A. MORGAN, M.A.

R. R. W. LINGEN, Esq., C.B.

MAJOR DONNELLY, R.E.

C. D. LOVELESS, Esq., Secretary.

Assistant Professor CARLTON J. LAMBERT, M.A., F.R.A.S., examined.

589. (*Chairman.*) Your title is Assistant Professor of Mathematics?—Yes.

590. But you are really not assistant to any one, your position is independent?—Totally independent.

591. You have a class of your own, and instruct it according to your own discretion?—Yes, entirely.

592. The persons whom you instruct are gunnery lieutenants, half-pay officers, marine officers, and probationary lieutenants of the Royal Marine Artillery, are they not?—Yes, but not the whole of the half-pay officers, only the upper division. The whole of the executive department is divided into two divisions; I have the upper division under my charge.

593. You have the assistance of Mr. Laughton?—No, Mr. Gleed is my assistant.

594. How many does your class consist of?—At present 42.

595. You are engaged in teaching them from 9 till 12 every day, is the whole number present all that time?—I have divided my class into two divisions, and give two courses of lectures. The elementary course is attended at 9 o'clock by the whole of my class, and the advanced course is given at 10 o'clock to my first division only; and the rest of the time is spent in the study, with both divisions. While I am lecturing the first division, my assistant, Mr. Gleed, is with the second division in the study.

596. (*Mr. Lingen.*) You speak of "the study," is the study the lecture room, or is it a separate room?—I never lecture in the study.

597. By "the study" you did not mean an officer's own private study?—No, it is a large room.

598. A general room for study?—Yes, a room containing 40 or 50 tables.

599. (*Chairman.*) During that time, from 9 till 12, the students are never by themselves?—Never.

600. There is always either you or your assistant in the room?—Yes.

601. Your lecture, I suppose, is written down in its entirety, or at all events delivered continuously?—It is delivered continuously.

602. Without interruption by any of the students?—Yes, without interruption on the part of the students.

603. And then you give them problems to work?—Yes.

604. There is always some one ready to assist any student in any difficulty which arises?—Yes, a student is never, while in the study, left by himself entirely.

605. Do you find that you and your assistant are fully employed in attending on the students during that time?—Fully. Neither of us ever has a minute disengaged.

606. Are you able to attend to them all?—Yes, I think so, very fairly.

607. You do not feel that you require any further assistance?—No, I think I have no complaint to make on that score.

608. If you were called upon to suggest a better arrangement for their instruction, could you do so?—I could not.

609. Do any of the students ever come to you for instruction out of lecture hours, privately? I do not mean as private pupils, but for any additional assistance they may require?—Yes, very often. The practice is rather that I go to them than that they come to me, because I live out of the college. I sometimes, indeed I may say very often, go in the evenings to see them and to help them, partly as a social visit, and partly to help them in any difficulties which they may have.

610. No doubt if you are willing to do so, they are very glad to see you?—I am very glad indeed to do it; it is a pleasure to me.

611. They have no delicacy in applying to you?—Not at all, far otherwise.

612. I gather from you that they constantly do it?—Constantly.

613. (*Mr. Lingen.*) Do they prepare themselves by their own private study in the room which you call the study?—They prepare themselves in the study, and also in their own rooms in the evenings. A great deal of work is done by them in the evening without any help at all.

614. In their own rooms?—Yes.

615. When you occasionally visit them in the college in the evening, do you see them in their own rooms or in the study, or both?—In their own rooms. It is simply a social visit, but I generally turn it to some purpose.

Dr. T. A. Hirst, F.R.S.
14 Nov. 1876.

Assistant Professor C. J. Lambert M.A., F.R.A.S.
18 Nov. 1876.

Assistant
Professor
C. J. Lambert,
M.A., F.R.A.S.

18 Nov. 1876.

616. They do not prepare themselves for your lectures in the general study room, but that general study room is part of the lecturing accommodation?—They can do that or not as they please. At the end of every lecture I give a certain task to be done before the next lecture; they can either prepare it in the study, under the supervision of myself while I am there, or with the help of my assistant when I am not there, or they can do it by themselves in their own rooms in the evening.

617. (*The Rev. H. A. Morgan.*) Do your lectures require a considerable amount of preparation on your own part?—They always require some preparation, of course, but not so much now as at first. It becomes easier to me year after year. Of course my experience of one session helps me considerably in the next, but still it is necessary for me to devote considerable time every evening to preparation, for no class of officers that I have is in the same state of advancement as another class, and therefore I have to remodel my lectures every time.

618. Would it be possible for you to undertake a certain amount of extra work not connected with the college without unduly burdening yourself with work?—I could not undertake any more.

619. In fact one may say that your whole time is given up to the instruction at the college?—Yes, my whole time. I have no energy for anything else.

620. (*Major Donnelly.*) What is the nature of the course of instruction that you give; what amount of mathematics does it cover?—I have to assume that a certain amount of mathematics is known when my pupils arrive; and I endeavour (and hitherto I have succeeded) to get through the following subjects: algebra, trigonometry, analytical geometry, statics, dynamics, hydrostatics, differential calculus, integral calculus, and the application of the integral calculus to problems which arise in the physical subjects, namely, dynamics, hydrostatics, and astronomy. That is about as far as I have been able to go as yet, but all the present indications tell me that the standard is continually advancing, and that the time will come when we shall attain a standard considerably above that which we now reach. The class which I have at present is in advance of any class which I have had before. Of course that is partly due to many officers coming back to the college after having had the advantage of one session; and also partly due to the general improvement in the scientific education in the navy which the college is undoubtedly bringing about.

621. (*The Rev. H. A. Morgan.*) Do you think that your lectures will ever embrace such subjects as partial differential equations of the second order and the calculus of variations?—I should think not in the immediate future; but in some years time they might certainly do so.

622. (*Major Donnelly.*) I suppose you have portions of the students in your classes taking up very different portions of their course at one time, under your instructions?—Yes, my first division takes it all from one end to the other, omitting nothing, but my second division generally has to omit two or three of the subjects enumerated.

623. What I meant was this; are there not at one time different portions of your class in very different portions of that course which you have mentioned?—Yes, I have two subjects going on at once, an elementary subject, and an advanced one. At the present moment, for instance, the subjects we are working at are trigonometry and the higher part of co-ordinate geometry. My first division is doing both, but my second division is at work entirely at trigonometry, and does not attend the lectures on co-ordinate geometry.

624. (*Chairman.*) What is the standard of the students knowledge when they are admitted to the college generally?—Very low as a rule.

625. Do you admit any who do not know algebra?—No, when I say "very low" I mean relatively to what they have to attain to by the end of their course.

They have all of them had the advantage of instruction on board the "Britannia" as cadets, and they have had naval instructors on board their ships afloat, but in spite of those advantages they attain a very low standard when they come to the college.

626. It appeared to me that the examiner's standard which the acting sub-lieutenants had to come up to in respect of mathematics was really not very much higher, if at all, than that which they had already attained on board the "Britannia." Is that so?—I think that is true. But I think the sub-lieutenants do attain that standard, whereas on board the "Britannia" I think the standard is not really attained. I speak subject to correction on that point.

627. We put the "Britannia" examination papers of the year 1873 before Dr. Hirst, and he was of opinion that there was very little difference between them and the papers set for the sub-lieutenants at Greenwich; but, perhaps, since then the examinations on board the "Britannia" have been made more easy?—I cannot speak with any certain knowledge about the "Britannia," it is entirely out of the range of my duties.

628. Would any student who has passed his examination as a sub-lieutenant be competent to go on with your course, beginning at your lowest point?—I think he would if he had attained at least the standard of a second class sub-lieutenant, but I should think if he had only attained a third class, he would not be fit for my course.

629. When you speak of hoping to attain to a still higher standard of mathematical knowledge, do you refer to mathematics in the abstract or to mathematics in so far as they are useful to naval officers?—Certainly not in the abstract.

630. You bear in mind the requirements of the service?—I not only bear them in mind, but have a very strong leaning towards the practical application of mathematics rather than to mathematics in the abstract. And it gives a character to my lectures and teaching at the college. Of course, very little can be done without a good grounding in abstract mathematics, but as soon as possible I get on to the more practical subjects, mechanics, hydrostatics, &c. I only regret the shortness of the course, for I feel that if I had a little longer time with the officers I should be able to teach them just enough more to enable them to apply their mathematics to all the physical problems they would meet with in their profession. I have constant indications of the fact that the course is too short. I have in my pocket three letters from an old student of the college who writes to me from the "Excellent," asking me to help him in some problems that he is working at, which bear upon his professional work. These happen to be problems in gunnery. Other officers ask me questions under similar circumstances. The principles involved require a higher mathematical calculus than I have been able to teach in the short course at Greenwich, and I have to supplement my teaching at the college by correspondence afterwards. That shows me that the time the gunnery lieutenants have with me is not quite long enough. I should like them to have a little longer time so that I might be able to teach them, for instance, something more of the dynamics of a rigid body.

631. You think that even the practical requirements of the navy might hereafter call for a higher standard of mathematics than is at present attained?—I have no doubt of that at all.

632. (*The Rev. H. A. Morgan.*) I have been looking over the examination papers which are set to your class, and I see among them papers set by Mr. Niven in the differential and integral calculus; what knowledge have the students of differential and integral calculus when they first join?—None whatever. I think probably one student may have had some little knowledge of it, but it may almost be said that they knew nothing about it. I am speaking of past sessions. The case is a little different now. Three at least of my present pupils had a good know-

ledge of differential calculus when they entered in October last. These will, I hope, in consequence, attain a higher standard at the end of their course than that reached in any previous session.

633. How long do they learn it before this examination?—For nine months; that is their whole course.

634. That is a very short time?—Very short; but I may say that as a class they are the best I have ever had in the course of nearly 10 years experience.

635. (*Mr. Lingen.*) Those are the gunnery lieutenants?—Yes; and also the best of the half-pay officers and marine officers.

636. (*The Rev. H. A. Morgan.*) They would be studying other subjects at the same time during those nine months besides the differential calculus, I suppose?—Yes. All the other subjects which I enumerated I attribute the great progress that they make in the short time to the fact that the majority of them are at just the best age for learning. Their average age is, I suppose, 24 or 25, and I fancy from my experience that that is the best age for learning. They have got over their boyhood, and they know that their time is valuable, and they come to the college with a distinct idea of working hard.

637. And in fact they do so?—They work very hard indeed.

638. I suppose they have a certain amount of knowledge of co-ordinate geometry when they come?—None whatever in past sessions.

639. Then they have to begin from the very beginning of analytical geometry?—Yes.

640. They learn in their college course something of conic sections as well?—Yes.

641. (*Major Donnelly.*) I suppose that which we find called A1 in these papers is your first class?—No, that refers to Professor Miller's department, it does not belong to the executive branch at all; the two departments are quite as distinct as they were originally, when A1 was taught at South Kensington and my division was taught at Portsmouth.

642. Is yours A2?—No; that is also not of the executive branch. B1 and B2 refer to the executive branch.

643. (*The Rev. H. A. Morgan.*) Do you suppose that the students who were working at the differential calculus and so on, had any private instruction to assist them besides the instruction which they received from you?—There have been isolated cases of it, but that does not go on now. I have set my face so strongly against it that I do not think any pupil in the room will take private tuition now. It has never been a common practice, but there have been in one year perhaps as many as four pupils having extra tuition, but they did it privately, and did not even let me know that it was going on. I found it out by accident, and then I discouraged it most strongly, and it was discontinued.

644. Have you the same class for three hours consecutively?—Yes.

645. But you only lecture I suppose for one hour or so out of the three hours?—Practically my lecturing is for two and a half hours a day. I have one lecture for my first division following one for both divisions. The second lecture will generally not be finished before a quarter or half-past eleven. That will make nearly two and a half hours of lecturing.

646. What I wanted to find out was what opportunity the students have of asking you to help them in the many difficulties which will occur to all who are studying the differential calculus for the first time?—In the case of the differential calculus I give them as much private help as they can require in the study, that is to say, in the large room.

647. After the lecture?—Yes, and they get helped by me on any possible occasion. Sometimes after a lecture they come up and ask me questions in the interval between one lecture and another. It often happens that I am kept in the lecture room for a quarter or half an hour after the lecture.

648. Could they obtain assistance also from Mr. Gleed?—Yes, both in the morning and afternoon.

649. On these very subjects?—Yes.

650. (*Major Donnelly.*) Do you think that there is sufficient tutorial assistance in working up the matters you have lectured upon, that is to say, do you think that your having only Mr. Gleed to assist is sufficient?—I think that in the present state of the class there is just the proper amount of assistance. I should be very sorry to see any more given at present for I think for successful learning it is necessary that there should be a certain proportion maintained between the time devoted to private work and the time given to instruction by the professor. I think this proportion is well maintained as it now stands.

651. I referred to tutorial assistance in private work as well as in the class room?—There is no tutorial assistance except in the class rooms.

652. Do you not think that it would be of great advantage to the students if there was?—I think it would be a distinct disadvantage. I have known not many, but some cases of pupils who have sought this tutorial assistance out of hours and have distinctly suffered and done far worse in the end than they would have done if they had been content with what they had in class.

653. (*The Rev. H. A. Morgan.*) Do you suppose that any Cambridge men go to Greenwich with a view of obtaining private pupils from amongst the students?—I think not. Private tuition is now discouraged so strongly in the college that I do not think any Cambridge man or anyone else would have any chance of obtaining any valuable patronage in that way. I do not know one such man certainly. I may say that I do not know the name of a single tutor out of the college who helps the students.

654. I suppose none of the lecturers in the college take private pupils?—As far as those whom I know best are concerned I should say I believe certainly not, but I cannot say for certain that there is no lecturer in the college who takes private pupils. I think there may be one, but I cannot speak certainly on that point. As far as myself and the instructors who have to teach the executive branch are concerned I may say that none of us take private pupils. I am speaking now of the present time, a year ago it was slightly different. Then my own instructor took two or three, but that was a year ago, and at that time Mr. Gleed was not my instructor, Mr. Henry then assisted me.

655. (*Mr. Lingen.*) Did he take those private pupils with your cognizance and approval?—He took them with my cognizance, but hardly with my approval.

656. (*Chairman.*) I suppose Mr. Niven is well acquainted with the course of instruction which the students, whom he examines, have gone through?—Yes, he is.

657. And the questions he puts are set with reference to that course of instruction I suppose?—Yes.

658. They do not go beyond it?—No.

659. You have never had any occasion, I will not say to complain, but to remark that any of this questions go beyond your own course of instruction?—I do not recollect any occasion.

660. (*The Rev. H. A. Morgan.*) I suppose Todhunter's text-books are used?—I use text-books only as collections of examples. My students all make their own text-books from my lectures.

661. Do you give them a manuscript prepared by yourself?—No, they write it all out from my lectures.

662. You would not limit Mr. Niven to anything in the way of manuscript, would you?—Not at all. I send the examiner a syllabus of the work that has been done. That is all the instruction he has, and he sets what questions he likes within the range which is shown in that syllabus. Of course he may use any text-book he pleases.

663. (*Chairman.*) From what you have told us, and from what we at present understand of the arrangements of the college there does not seem to

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be any reason at all why you should be called Assistant-Professor instead of Professor?—None whatever. My duties and Professor Miller's are as distinct as they were when Professor Miller's department was at South Kensington and mine was at Portsmouth.

664. Then although it may not be a matter of much importance, I daresay you would wish to get rid of the epithet "Assistant," and be called "Professor"?—I should indeed. The epithet is invidious, of course.

665. Is there anything else with regard to your position in the college upon which you would like to make any remark?—There is the question of salary, of course, which is the only other point on which there is a difference between my professorship and all the others. My salary is at present 500*l.* a year, and that of all the other professors is 600*l.*

666. Have you ever made any representation on that subject?—Personally, I have not, because I have had strong advocates in Dr. Hirst and the admiral, who have ever since I have been at the college been representing this anomalous position of mine to the Admiralty, and asking that it should be altered. They have done so, with success, I believe, so far as this, that the Admiralty have granted the change in title, and have made provision for the increase of salary, in the estimates.

667. The Admiralty have approved of that increase, and it has been voted in the estimates?—Yes; it was voted in the estimates which passed the House of Commons.

668. But it has not yet been carried into effect?—No, it has only received the provisional sanction of the Treasury.

669. (*The Rev. H. A. Morgan.*) Do you desire to be called only Professor of Mathematics, or professor of some particular branch of mathematics?—I think "Professor of Mathematics" would be distinctive enough.

670. That would be exactly the same title as Professor Miller's?—Yes. I may mention that it has been suggested that the title attached to my office might be made distinctive by having the words "executive branch" added.

671. You would not wish the one to be the Professor of Pure and the other Professor of Applied Mathematics, or anything of that sort?—No; that would imply a distinction which does not really exist. The only difference which at present exists is that some of Professor Miller's pupils attain a higher standard than my own.

672. Do you consider that it is desirable for the students at Greenwich that there should be two professors there of such high mathematical attainments as yourself and Professor Miller's?—Yes.

673. You think that both are required?—Most certainly there is more to be done than one of us could do. Professor Miller's department, is, as I have stated, quite distinct from mine. He never sees any of my pupils, and I never see his. In fact, I do not know one of his pupils.

674. (*Mr. Lingen.*) You have none of the engineers in your class?—None at all. My work is entirely with the executive branch, and Professor Miller's entirely with the other branch.

675. (*The Rev. H. A. Morgan.*) Could not such instruction as you give be given by some one of much lower mathematical attainments than yourself?—I should not like to offer an opinion on that point.

676. A twelfth or fifteenth wrangler could instruct the students in the differential calculus?—I think he could not do it properly. I may say that the best of my pupils at Greenwich attain as high a standard as the candidates for mathematical honours whom I lectured at Cambridge on the same subject there.

677. Do you mean men in their second year at Cambridge?—Yes. They were mostly second year men.

678. Then the students must make very remarkable progress, for you say that they come to the college knowing nothing of co-ordinate geometry or the differential calculus?—They make a progress which

was to me quite as surprising as it is to you. I could never have predicted it. I ascribe it to the fact that nearly every man in my class works an average of eight or ten hours a day. They work with such energy as I have never seen exceeded and seldom equalled by an honours man at Cambridge. As I have already stated, they are the best class I ever had in my ten years' experience, and better than the honours men whom I lectured under the inter-collegiate system at Cambridge; I am speaking of them as a class.

679. (*Chairman.*) Do you think, then, that your best men would be wranglers at Cambridge?—Certainly, and high wranglers.

680. (*Mr. Lingen.*) You account for it by the greater stamina of the men. It is the difference that there is between three year olds and five year olds?—Yes, I think the best of my men would easily be wranglers. I am sure of it.

681. (*Chairman.*) Have you ever compared your papers with the mathematical papers set for the East India Civil Competition?—I have compared them. I think ours are quite as difficult.

682. Do you think, then, that your students would take a very high place in the mathematical examination for the East India Civil Service?—Yes, the best of them would take a high place. I am sure it is the difference in age which is at the bottom of the greater part of this remarkable progress. It is generally the case that the younger men of my class, whose average age is 24 or 25, do the best. A senior officer, a captain, for instance, may work as hard or even harder, but he can seldom make the progress that a younger man makes.

683. Most of them have good mathematical heads to start with?—I think not necessarily. They have fair mathematical ability to start with, but their energy does as much as their ability, I think.

684. To a certain extent they have been already weeded?—Yes, to some extent.

685. These are volunteers?—Yes.

686. They have been weeded both at the entrance into the "Britannia" and at the subsequent examinations on going out of the "Britannia," and they have also been examined at sea?—Yes, and they are weeded again when they come to the college, because it is only the upper half who come to me, the other half go to Mr. Laughton's room; no doubt I have the best of them.

687. (*Mr. Lingen.*) I think I understood you to say that the students who attend your lectures are lectured in two divisions?—Yes, but when I lecture the second division I lecture them both. When I lecture the first division the second division is up in the study with Mr. Gleed.

688. Between one lecture and another you said that they had certain problems to work which were looked over at the second lecture?—At the end of every lecture I set a number of problems to be done before the next lecture.

689. Your lecture being ended each officer goes with those problems in the first instance into the study as I understand?—Yes.

690. If he has finished those problems while he is in the study does your assistant give him fresh problems to do in his own study?—The occasion has never arisen. I have always given so many that they have never had a chance of finishing them all.

691. They do as many as they can of them in the study?—Yes.

692. And the next in their own rooms?—Yes.

693. When are the problems which the officer has finished in his own room, looked over; are they looked over by your assistant or by yourself the next time the officer goes into the study?—Yes, by either of us.

694. You have such a good class that the men do not shirk their work, but if a case arose of an officer who did not between one lecture and another work those exercises, does the college system provide any mode of his being reported?—If that happened continuously he would certainly be reported. Such omission would show its effect in the weekly examinations. Every Saturday I examine my officers by

giving them a test paper upon the work which has been done in the preceding week or fortnight; that is a regular weekly institution. Mr. Gleed and I look over the papers and put marks upon them, and we have the list all ready by nine o'clock the next Monday morning. The first lecture on Monday morning is devoted to the explanation of the difficulties which have arisen in the test paper. That arrangement saves, of course, a great deal of time. Instead of going through each man's paper individually, I go through the whole in the lecture, and so, of course, every man has his difficulties explained. No Saturday passes without its regular examination, there is one going on to-day.

695. The only part of the regulations with the sufficiency of which you expressed any doubt, was the shortness of the course that these officers go through?—Exactly.

696. Do you see your way to any practical recommendation with regard to altering the duration of the course?—Admiral Sir Cooper Key discussed the matter with me a year and a half ago, and he said that he had been endeavouring to bring it about that the gunnery lieutenants should be allowed to come to the college at Easter instead of in October, and that they might take their certificates in the June of the year following. That would give them a clear twelve months' instead of nine months' lecturing. I should be very glad to see that regulation put in force. I think it would be a very great advantage.

697. One of the questions referred to us is whether, having regard to the course of study laid down for the various classes of officers, the staff of instructors is adequate and properly arranged. I understand from your former answers that you think that the number of instructors is sufficient, but you also think that with regard to the course of study laid down there would be room for an extension of the time?—Yes; I certainly do think so, and I believe that the time will come when the scientific requirements of the service will be such that the time must be extended.

698. (Chairman.) Have you anything to do with any examination in the college?—With none whatever now. Last year I was appointed to examine the sub-lieutenants in physics at their monthly examination, and at the end of the first session I was appointed to examine Professor Miller's division, Professor Miller being appointed to examine mine. With one trifling exception, when I was asked to set a paper for the younger marine officers in physics, those are the only occasions on which I have examined in the college. Of course I am alluding now to final examinations. I have plenty of examinations of my own class. I have one every week.

699. (The Rev. H. A. Morgan.) Do you give anything in the way of merit marks at those weekly examinations?—Yes, certainly; there is a list published every Monday at 9 o'clock; and there is considerable rivalry amongst my students in consequence. Not only is the list published with the marks obtained by each student, but a record is kept of the result of every test paper, so that every officer can see how he has improved or fallen off from week to week during the whole session.

700. Do you make any use of the marks so given in the aggregate?—The test papers do not count at all in the final result.

701. Do you make any use of them in classifying the students at the end of the year?—Not at all; I set the test papers for educational purposes only. They are a powerful means of consolidating the knowledge which has been acquired.

702. You find it a powerful stimulus, I suppose?—Very powerful.

703. (Major Donnelly.) Do you find the result of your examinations and of the outside examinations to be about the same?—Yes, I can nearly always predict who will be the highest in the final examinations. Those officers who do well in my test papers are always the officers who come out highest in the examinations at the end of the session.

704. (Chairman.) Do you ever give any extra lectures in the afternoon. I mean voluntarily?—Not a formal lecture. I have given lectures in the afternoon; and I have given lectures in the evening but rarely and occasionally.

705. Were those lectures of a public character?—No; and they were not formal lectures.

706. (Mr. Lingen.) One of the questions upon which we have to report is "what courses of lectures should be given in the year, if any, beyond those delivered by the regular instructors." We have had some evidence upon the subject and it appears that some of the professors or instructors attached to the staff of the college give lectures under the sanction of the college authorities of a more or less public character. I think the question which was put to you was whether you have given any of those lectures?—No, I have never had to give any of those lectures. I thought the Chairman referred to a voluntary lecture to help my pupils on privately. I have done such a thing as that in the evenings occasionally, but those lectures have been of a very informal character, they have not been in the class room at all.

707. (Chairman.) Have you any suggestion to make to us?—I think I have nothing further to mention.

708. (The Rev. H. A. Morgan.) Difficult mathematical problems will arise with respect to gunnery and with respect to the construction of ships and so on, especially now that those practical matters have been carried to the point that they have reached?—Yes, certainly.

709. And those problems sometimes involve the highest mathematics?—Yes, practical problems involving the very highest mathematical principles constantly arise.

710. And there will be more of them every year?—Yes, there will be more and more. I see indications of a growing tendency.

711. Do you consider that the present method of paying the professors and instructors is satisfactory, by giving them fixed salaries, or, would you consider it better that they should be paid by gradually increasing salaries, in some cases at least, or else in proportion to the number of students attending their classes?—I certainly think that there should be some prospect of an increase in the value of the professorships and instructorships.

712. When lecturers receive payments varying according to the number of their pupils, that acts as a considerable stimulus?—It seems to me that it would certainly be much better if all the professors had some ultimate prospect of an increase in the value of their professorships.

713. (Mr. Lingen.) There is not free trade in students, and it would be difficult if a professor's students were allotted to him to pay him a fee of so much per student?—Yes, I should be sorry to see that done.

714. (The Rev. H. A. Morgan.) Might not that system be adopted partially and carried out to some extent?—I do not think it could well be adopted in an institution like the college at Greenwich.

715. If the salaries were increased gradually do you not think that that would be an inducement to good men to remain as professors at Greenwich?—Most decidedly, I think that is wanted. Of course there ought to be some ultimate prospect of something better in the shape of an increasing rate of payment, otherwise we shall always be tempted to be looking out for some appointment offering better prospects than we have at present.

716. (Mr. Lingen.) How do the rate of pay and the advantages generally compare with the emoluments and position of a college tutor of your own standing at Cambridge?—It is difficult to compare them, because the emoluments of a college tutor are so various and arise from so many sources. Taken as a whole I should say that a professorship at Greenwich

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does not bring nearly so much stipend to the professor as would be brought to a resident fellow and lecturer at the University. I know in my own case that my present salary is far below what it was at Cambridge when I was a resident fellow and lecturer.

717. Independently of private pupils?—No, not independently of private tuition.

718. I wish to put the question with reference to what we may call average salaries from all official sources, excluding private pupils, of a Cambridge tutor?—If by a Cambridge tutor you mean a tutor of a college, his income would be as a rule very much larger than the value of our professorships; it would be about double, I should say.

719. I would limit my question to the amount of a college fellowship and to the tuition fees which a Cambridge tutor would get. I do not mean a senior tutor of Saint John's or Trinity, but what might be called an average college tutorship at Cambridge. At Oxford a college tutor would certainly, as a rule, get nothing except his fellowship and his tuition fees?—I cannot speak very certainly as to that. Of course I know more of my own college than of any other, but I should certainly think that a college fellowship, together with tuition fees, would be worth double as much as our professorships, that is to say, it would amount to 1,000*l.* or 1,200*l.* a year.

720. (*The Rev. H. A. Morgan.*) Full information on this subject is given in the report of the Cambridge Commission?—I believe so.

721. (*Mr. Lingen.*) Referring to the question which I have just asked you as to what was the amount of the average emoluments of a college tutor at Cambridge from his fellowship and from his tuition fees, but excluding his receipts from any private pupils, would your answer have been different had I used the term "lecturer" instead of "tutor"?—My answer would have been different. I should then have stated from 600*l.* to 700*l.* a year. I should like to mention that there is a great difference between a college tutor and a college lecturer at Cambridge. A college tutor has the whole of his time employed. He takes fees for tuition from every undergraduate in his college, and consequently makes a large income, the average being, I should say, something about 1,200*l.* a year, whereas a college lecturer has only a few hours a week, we may say from 4 to 10 hours a week, engaged in lecturing, and he has the rest of his time entirely free from any official duties. This time he generally devotes to private tuition, by which many lecturers make a very large income.

722. (*The Rev. H. A. Morgan.*) The income of a college tutor varies very greatly. There are only two colleges at Cambridge where it is as much as 1,200*l.* a year?—Being a non-resident member of the University I have no certain knowledge on this subject, but I certainly thought that there were in Cambridge many tutors whose total income, derived from University and College sources, reached 1,200*l.* a year.

723. (*Chairman.*) There are few college tutors at Trinity, are there?—I believe there are three.

The witness withdrew.

Professor A. W. REINOLD, M.A., examined.

Professor
A. W. Reinold,
M.A.

724. (*Chairman.*) Your class consists, as it appears, of gunnery lieutenants, half-pay and marine officers, engineers, and naval architects, and private students, to whom you lecture two days a week?—Yes.

725. From 9 to 1?—From 10 minutes to 12 to 10 minutes to 1.

726. According to the statement we have before us, it is from 9 till 1 in the morning?—The lecture itself lasts for one hour, but then there is the time required for preparation for the lecture.

727. You have for practical instruction the gunnery lieutenants, the half-pay officers, marine officers, engineer officers, assistant engineers, naval architects, and private students?—Yes.

728. To them you give practical instruction on Mondays, Wednesdays, and Thursdays from 2 to 5?—Usually on four days in the week: Mondays, Tuesdays, Wednesdays, and Thursdays from 2 to 5; but at one time of the year on only three days in the week.

729. (*Mr. Lingen.*) What is your title in the college?—Professor of physics.

730. (*Chairman.*) Then there is the general superintendence of the duty performed by the assistant on Friday from 2 to 4?—Yes.

731. And lectures besides on Tuesdays and Thursdays from 4 to 5; is that so?—There is some error there. There is instruction then, but not experimental lectures.

732. Then where it is called in the tabular statement before us "lectures" it should be instruction, on Tuesdays and Thursdays?—Yes.

733. How many students have you in those classes? We will take the first set at the lectures and preparations on two days in each week from 9 to 1?—There are at the lectures about 110 on the average.

734. Are those students all in one lecture-room?—Yes.

735. And for practical instruction on those four days or three days in the week, how many have you?—Last session there were altogether 58 students working practically at physics.

736. That does not correspond with the number given in this paper, which is 19?—The number varies at different times, but the total number last session was 58. When I speak of 110, I mean that that is the average number of students who attend the experimental lectures.

737. (*Mr. Lingen.*) Independently of classification 110 pass through your hands?—Yes, 110 attend those lectures.

738. (*Chairman.*) Were there 110 at one time?—Yes, and sometimes more.

739. (*Mr. Lingen.*) But not all present together?—Yes, all present together at the same time; the room accommodates about 140 or 150.

740. (*Chairman.*) Do you find that you can sufficiently instruct that number at the same time?—Yes.

741. What kind of lecture is it that you give?—It is a formal experimental lecture.

742. Therefore the number that attend is not of any very great importance?—No.

743. (*Mr. Lingen.*) When you speak of a room, how is that room furnished? is it a laboratory?—It is a lecture room specially furnished for this purpose; it is used by me only.

744. Is it furnished with a gallery?—With ascending steps and also with a gallery.

745. (*Chairman.*) When you are preparing for the lectures I suppose none of the students are present?—None of them are present then.

746. The preparation is in order that you may deliver the lecture?—Quite so.

747. The lecture lasting one hour, does it always take you three hours to prepare for it?—It generally takes two hours on that day, sometimes more; sometimes half an hour or an hour on the previous afternoon.

748. During the practical instruction on Mondays, Tuesdays, Wednesdays, and Thursdays of course you are always present in the room giving that instruction?—Always.

749. Do you give it to the students individually or in class?—They come in classes, that is to say, the

half-pay officers come together, the engineers and naval architects come together, and so on, and they have operations set to them to perform during the afternoon, and I, with the assistance of Mr. Waghorn, my assistant, overlook them and see that the work is done as it should be.

750. Are all the different classes present at the same time?—No, only one at a time.

751. How long is each class present?—For three hours, from 2 o'clock until 5.

752. Then of course you have different classes on different days?—Yes.

753. To whom are the lectures that you give on Mondays, Tuesdays, Wednesdays, and Thursdays from 2 to 5 addressed?—To all the students in the College who take up that subject.

754. How do those lectures differ from the lectures which you give on two days in the week from 9 until 1?—There are not lectures lasting all the time from 9 until 1; the lecture is only from 12 to 1.

755. But how do the lectures that you give on Mondays, Tuesdays, Wednesdays, and Thursdays differ from the lectures which you give twice a week in the mornings?—In the experimental classes in the afternoons the students actually work practically themselves.

756. Do you find that you are able to give all the instruction which the various classes of students require, with your present assistant?—Yes, I think so.

757. You would not wish for any further aid?—Not at present. I think I should not want any further aid unless the number of students were to increase.

758. The system is satisfactory as far as you are concerned?—Yes, at the present time.

759. And you could not suggest any improvement at present?—No, not at present.

760. The first head of the inquiry which we have to take up is this "Whether, having regard to the course of study laid down for the various classes of officers, the staff of instructors is adequate and properly arranged with reference to the assistance required by the students;" as regards your own department you say that it is?—I think it is.

761. We should be very glad to hear any remarks you have to make upon that subject?—I have no remarks to offer, except with regard to the remuneration which my assistants receive.

762. (*Major Donnelly.*) What branches of physics do you lecture on?—Hydro-mechanics, acoustics, magnetism, electricity, heat, and light.

763. Then chemistry does not form a portion of your course?—No, it is entirely in the hands of the professor of chemistry.

764. What does the practical work consist in?—In practical operations connected with all those subjects. If you wish it, I will go into particulars to show you the kind of thing that is done. The students at the beginning perform such operations as determining the specific gravities of bodies, and making and learning to read accurately the barometer, and afterwards, in electrical work, they do such things as determining the resistance of conducting bodies, and so on.

765. I see that there is an examination paper in physics, but is there any examination in the practical work?—There is an examination also in the practical work.

766. (*Mr. Lingen.*) Your lectures are given partly, at all events, in the lecture-room, and the instruction is given in the laboratory; is that so?—Yes.

767. What is the maximum number of students whom you have at one time in the laboratory?—The largest number I have had was 23.

768. All, or nearly all the work in your branch of study has to be performed, I suppose, either in the lecture-room or in the laboratory, comparatively little can be done in the officers own private rooms?—That is so.

769. Are the afternoon lectures, which appear to be a kind of combination of work by the officers them-

selves, and of your lectures to them, given in the lecture room or in the laboratory?—In the laboratories.

770. Do you find that the officers entering the college have a competent knowledge of the elements of your subject, or have you to begin from the very beginning with them?—As a rule, I have to begin from the very beginning, except with those who have previously passed through the college as sub-lieutenants.

771. That absence of preparation entails a greater amount of labour per individual than if they came better prepared?—Certainly.

772. And so far it has a bearing upon the adequacy of the staff to the number of students?—Yes.

773. Have you any recommendation which you would like us to consider as to the previous studies of the officers entering the college? What my question points to is this: During the six years that they are at sea, do the examinations which they undergo at that stage of their career bear at all upon your class of subjects?—I do not know the nature of the examinations which they pass before they come to the college.

774. You do not even know whether the examinations which they have to pass during their sea service contain questions upon physics at all?—I do not know that.

775. Should you think that it would be of advantage that the professors in the college should have the means of making recommendations upon that previous course of study between the time of an officer's leaving the "Britannia" and his entrance into the college?—It might be advantageous.

776. At present there is no machinery by which you are even cognizant of what those studies are?—No.

777. (*Major Donnelly.*) I see that you have an assistant and a demonstrator; does the demonstrator merely assist you in your lectures, or does he assist you in your laboratory as well?—The principal part of the demonstrator's work is to prepare for, and assist in, the lectures; he has also teaching work to do in addition, especially for the sub-lieutenants.

778. In the laboratory?—No, they do not do any practical work. Their instruction is given to them in their own studies by Mr. Haddon, and also by Mr. Waghorn; it is given by Mr. Haddon three days a week.

779. (*The Rev. H. A. Morgan.*) What knowledge of mathematics ought the students to possess in order to appreciate your lectures; how high ought they to have gone beforehand?—I do not expect a knowledge of trigonometry; if they possess it so much the better, but the lectures are quite elementary.

780. You do not treat the subjects you have mentioned, such as heat and light, and so on, mathematically at all?—No; not at all.

781. Experimentally only?—Yes.

782. (*Chairman.*) Will you run your eye over this, which is one of the "Britannia" papers, and tell me whether you think the students who come under your instruction could answer pretty fairly such a paper as that when they first come to the college (*handing a paper to the witness*)?—I should say that an average half-pay officer would not be able to answer very much of that paper.

783. (*Mr. Lingen.*) And the acting sub-lieutenants still less so?—Yes, I should think still less so.

784. (*Major Donnelly.*) Do the acting sub-lieutenants come to your lectures at all?—Not to those lectures of which I have spoken; they have a special lecture.

785. I see there is an examination for the acting sub-lieutenants; is that after or before they have gone through the college (*handing a paper to the witness*)?—This paper is set to them at the end of their college course.

786. (*Chairman.*) I think you wish to say something with regard to the remuneration of your assistant,

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Mr. Waghorn?—I do not wish to say anything about his salary, but I do about that of Mr. Haddon.

787. He is your demonstrator?—Yes.

788. What was the position of Mr. Haddon before he became your demonstrator?—He assisted in a similar position, I think, in the Royal College in the Mauritius from the time when he left school.

789. He is not in the naval service at all?—No.

790. He does a great deal of work, does he not?—A great deal.

791. Does he attend from Monday to Friday from ten to five?—Yes, and he attends on Saturdays also.

792. On Saturdays his attendance is from ten to one?—Yes.

793. (*The Rev. H. A. Morgan.*) He attends the same number of hours as Mr. Waghorn, does he not?—I suppose they should both attend equally, but as a matter of fact Mr. Haddon generally comes earlier in the morning; he is usually there soon after nine o'clock.

794. (*Chairman.*) Is his remuneration 150*l.* per annum or 175*l.*?—150*l.*

795. And you think his services ought to be more highly remunerated?—I think that his salary is inadequate.

796. Does he live at Greenwich?—Yes.

797. Has he a house?—No, he is a bachelor.

798. He has no allowance for house or lodgings?—None whatever.

799. (*Mr. Lingen.*) Do you know what he received at the Mauritius?—I do not know that, but I think I am right in saying that it was about 200*l.* a year.

800. Is there any employment out of the public service with which you can compare this, in point of remuneration, so as to give an opinion as to its market value?—He is the sort of man who might now look forward to himself becoming a teacher or a professor, and as such he would of course have a larger salary.

801. (*Chairman.*) Would he be competent to take Mr. Waghorn's place, if it was vacant?—Before the appointment of Mr. Waghorn he performed the same services which Mr. Waghorn now performs.

802. (*The Rev. H. A. Morgan.*) Mr. Waghorn receives altogether 284*l.*; it is stated as being 120*l.* and 9*s.* a day?—Yes.

803. (*Mr. Lingen.*) Is it necessary for the purposes of Mr. Haddon's present office that he should be a man of such great qualifications?—No, it is not.

804. Therefore if we increased Mr. Haddon's pay we should be rewarding his personal merits rather than paying for what his office requires?—Yes, but I think his office should be more highly paid than it is at present. I think it is quite fair that a man when he is first appointed to such an office should receive only 150*l.* a year, but when he remains, as Mr. Haddon has remained, and makes himself so valuable as Mr. Haddon now is, I think the salary should be increased.

805. Is Mr. Haddon a more valuable officer now than he was when he first came?—Certainly; and he does work now which he had no idea that he would be called upon to do when he joined the college.

806. Is that work which no one else ought to do except the holder of Mr. Haddon's office?—That I cannot say. I mean in the instruction of sub-lieutenants and in assisting me also in examining the answers to the questions set to the general class.

807. Of course the tendency is if you put a better man in an office than the office requires that he will draw other people's work to himself, or that he will make work which may be exceedingly valuable and important, but still in looking at the office itself and fixing the remuneration for it, we must consider simply what the office itself requires; do you think that the office itself requires a higher payment than 150*l.* a year quite irrespective of Mr. Haddon?—Yes,

I think the salary attached to it should be 200*l.*, after a time at all events.

808. (*Chairman.*) You never act as examiner in the college, do you?—I do not, except at Christmas and Easter. I never act as examiner at the final examinations.

809. What class of students do you examine at Christmas and Easter?—All those who attend my lectures.

810. They do not obtain any marks, I suppose, as the result of that examination?—Not any marks that count in the final examinations.

811. They obtain no advantage at all that counts afterwards?—No, it is simply a means of testing them.

812. The examination is partly for your own satisfaction, I suppose, in order that you may know how they are going on?—Yes, and it is also a great advantage to the students themselves.

813. Is the result of the examination published or made known to the students?—It is made known to the students; it is not made known publicly that I am aware of.

814. Do you think that the students are anxious to occupy as high a position in it as possible?—Yes, I have always seen such a desire evinced by them.

815. It acts therefore as a stimulus and keeps them up to their work?—Yes.

816. If you find that any student is not making any progress, what course do you take; do you represent the matter, or report him to the President?—I generally make a private report to the Director of Studies. I put the matter in his hands.

817. Does it often happen that you have occasion to do that?—No, not very often.

818. Was it not the case lately that a considerable number of acting sub-lieutenants failed to pass their examination?—I do not know that they failed in my subject. I am not aware whether they did or not.

819. I think it was mentioned in Parliament that at one examination there were a great number who failed to pass, seven or eight, I think?—Yes, that was so. I remember it.

820. You had nothing to do with their failure?—Nothing whatever.

821. You did not take part in the examination in which they failed?—Not at all.

822. Have you anything particular to bring before us in addition to what you have said with regard to your demonstrator?—I have also another assistant whose case I should like to mention.

823. Who is that?—He is in the position of a labourer in the place; that is, he is on the footing of a labourer so far as pay is concerned, but he does a good deal of work which an ordinary labourer could not do.

824. It is manual work, I suppose?—In the preparation of batteries for the lectures, in the preparation of oxygen for the lime light, and other really technical work. I think he ought to receive wages higher than those of a labourer.

825. What is his pay?—17*s.* 6*d.* a week.

826. (*Mr. Lingen.*) I am a little doubtful under which head of the references to us this case would fall; do his duties in any way connect him with the position of an instructor?—Although he is not an instructor, still his duties are in some degree those of an assistant in the preparation for lectures.

827. (*The Rev. H. A. Morgan.*) Does he get any rations or anything of that kind?—No, nothing whatever; he does not get any clothes like other messengers.

828. (*Mr. Lingen.*) Is he an old sailor?—Yes, he is an old blue jacket.

829. Therefore he has a pension?—Yes.

The witness withdrew.

JOHN KNOX LAUGHTON, Esq., M.A., R.N., examined.

J.K. Laughton,
Esq., M.A.,
R.N.

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830. (*Chairman.*) Your duties are those of mathematical and naval instructor and lecturer in meteorology and naval history, are they not?—Yes.

831. And the class of students whom you instruct are half-pay officers and marine officers, who are 40 in number?—About that, just at present; the number varies a good deal, and has been as high as 60.

832. Do you instruct acting sub-lieutenants as well as half-pay officers?—I do not instruct the sub-lieutenants, they merely attend my lectures in meteorology.

833. How many hours a week do your lectures and instruction employ you?—About 27 hours in the week.

834. But you say that you do not instruct the acting sub-lieutenants?—No, they attend my lectures in meteorology, but as instructor I have nothing to do with them.

835. Do you find that you are able to give all the attention which you think necessary to the students who come under your instruction?—I have an assistant instructor, Mr. Solomon, who is working with me in my mathematical class, which is at times rather heavy, but with his assistance we manage pretty well. I need not point out that a class of from 40 to 60 is heavy work, and it is considerably heavier than it otherwise would be from the fact that the officers are not appointed all at the same time. The bulk of them are appointed in the beginning of the session, in October; but after that, they keep dropping in from time to time as the Admiralty sees fit to appoint them; and these men as a rule have to begin at the beginning as the others have already done, so that there is a long dragging tail, which very much increases the work.

836. And therefore the course of instruction becomes more complicated?—Yes, the actual man to man instruction becomes much more heavy.

837. The committee have to consider whether the staff of instructors is adequate, and properly arranged with reference to the assistance required by the students; are you entirely satisfied on that point as regards your own department?—I do not see that it could be altered: The number of instructors is sufficient; but what I have just mentioned makes the work heavier than it otherwise would be.

838. But not so heavy as absolutely to make you feel the want of further help?—No, I think it is sufficient.

839. You give lectures and you also give individual instruction, do you not?—Yes.

840. The lecture I presume is something that you read, or at all events deliver to the whole class collectively?—Yes.

841. And then when the students are at work you give them problems and things to do, and you attend to them when called upon?—Yes, I attend to them, helping them in their special difficulties.

842. Do you find that you have time enough to attend to all?—Yes. The class, differing in the way that I have spoken of, breaks up into two or three divisions; one or other of us, myself or Mr. Solomon, gives each division a mathematical lecture every morning; whilst the one division is at lecture, all those who are not at that lecture are supposed to be working at their tables, and the one or the other of us is always in the room to help in the special work at the tables.

843. As regards the mathematical studies it is of very great importance, is it not, that every student should have his assistance just at the time when he wants it, because if not his time will be wasted?—Yes, with men of that stamp; they come to a difficult question, and if they have not the assistance ready to hand they will become discouraged.

844. And that assistance is supplied so promptly that they do not lose time?—Yes, as a rule it is. Of course there may be occasionally accidental delays, but I should say seldom.

845. I presume that the assistance that a man wants is such as takes up only a moment of time?—Very often it is so.

846. And then he goes on by himself?—Exactly.

847. That is more the case with mathematics than with any other study, is it not, that the student wants assistance actually on the spot?—I think so.

848. In learning a language, if a man comes to a sentence which he cannot master he can leave it and go on, but in mathematics he cannot do that; he must be assisted at the time?—Yes, partly cannot and partly will not. When men, such as we have to deal with, come to a difficulty which they feel that they ought to get over, if they cannot do it they lose heart.

849. (*Major Donnelly.*) Will you just explain the relation of your class to that taken by Professor Lambert?—They are men of exactly the same rank in the service, but from the numbers that come it is necessary to divide them into two classes, so that there is an entry examination; as the result of which, the gunnery lieutenants, and those who seem to know something to begin with, go into Professor Lambert's class, and those who appear to know nothing, or practically nothing, come into mine.

850. Then it is the same class divided up?—Yes, it is the same class of officers, but the men who go into Professor Lambert's class are, as a rule, of higher attainments; in fact they begin with some previous knowledge, but my men do not.

851. Do you think you have sufficient tutorial assistance for your class?—I think so.

852. (*The Rev. H. A. Morgan.*) What branches of mathematics do you lecture upon?—We begin from the very earliest elementary algebra and go on to trigonometry as far as we can. In addition to a fair knowledge of trigonometry, we generally get through some elementary statics, dynamics, and hydrostatics in the course of the year. The men vary very much amongst themselves. Some years I have got them into a little conic sections, but very much depends upon what knowledge they may once have had.

853. Do you find that many of these officers are ignorant of those elementary subjects when they come to you?—Yes, most of those that come to me are.

854. Have they, during their six years at sea, forgotten what they learnt in the "Britannia"?—With most, if not all, the time since they left the "Britannia" is much longer than six years; perhaps ten would be nearer the average; and as a rule they have so utterly forgotten what they learnt in her, that it would be difficult to say that they ever had learnt anything. In looking at their antecedents I see that almost all of those men, who are weeded out, as I have just described, to come into my room, have taken third-classes on passing as sub-lieutenants; and a man who has taken a third-class certificate probably never did know any mathematics worth speaking of.

855. Are they industrious when they are under you?—A fair proportion are. There is always a certain proportion that do as little as they reasonably can.

856. Professor Lambert has described the students in his class as exceptionally industrious; I presume you can scarcely say the same of yours?—Not of all of them certainly; I should say that a fair, and perhaps an increasing proportion of them work very respectably; but some, undoubtedly, do not.

857. (*Chairman.*) Do you remember the case of a considerable number of sub-lieutenants being rejected, which was noticed in Parliament?—I remember that such was the case; but I had nothing to do with either the instruction or examination of those who were then referred to; I merely know of it from being at the college and hearing it talked about.

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858. You do not know whether those men were idle?—From any knowledge, as specially concerned with them, I do not know.

859. (*The Rev. H. A. Morgan.*) Do you give those students weekly examinations with the view of testing their progress?—Not regularly, as weekly examinations, but from time to time, as we get to the different stages of their work. With me it is more like once a fortnight, or even once in three weeks.

860. I presume there is a great difference amongst the students in the amount which they know?—No; as a rule when they join, the men that come into my class know absolutely nothing, or if they ever have known anything, they have forgotten it, and we begin at the very beginning. After a time, they perhaps begin to recover any knowledge they may once have had, and some, from greater natural aptitude, push on.

861. They have all passed through the "Britannia" course, have they not?—All the lieutenants now at the college must from their seniority have passed through the "Britannia;" and I think all the commanders.

862. (*Chairman.*) Is it within your experience that some of the officers who come before you have really to begin again?—Not some, but all; or very nearly all.

863. (*The Rev. H. A. Morgan.*) Do you place under Mr. Solomon's care the weaker members of your class; do you select a certain number to be instructed by him?—Not for instruction; but when we divide for purposes of lecture, I take one division and Mr. Solomon takes another; and if we make three divisions, I shall take two, and he will take one.

864. Would he take the algebra and Euclid, and you take the trigonometry?—No, each of us would take a division. One division is more advanced than another. At present we have not divided for the lectures; I lecture on algebra four days a week, and he lectures on geometry two days a week.

865. Do you continue to take the same division yourself all along?—So far I have always taken the more advanced division; Mr. Solomon would take the second; and if there should be a third, I would take it.

866. How many would Mr. Solomon have in his class?—At present we have not divided.

867. How many would you have when you do divide?—Probably about 20.

868. You think that is not too large a number?—No, not for lecture. Our lecture room holds 50, and so far as the lecture is concerned, it is just as easy to lecture to 50 as to five.

869. And you could explain the individual difficulties of 20 in the time allotted, so that each would receive a fair amount of attention?—Yes; but we do not make any division of the class for instruction. We are both in the room, moving about from table to table, and ready to be referred to; a man refers his difficulty probably to the nearest, or to whichever of the two he chooses.

870. For how long a time have those gentlemen an opportunity of asking you to explain to them their difficulties?—One or other of us is in the room all day.

871. You are employed from nine o'clock to one; do you commence by giving a lecture?—Yes.

872. How long would that last?—Three quarters of an hour, or thereabouts.

873. Would the other three hours be devoted to explaining the difficulties which each student might have?—Yes.

874. So that in point of fact if there were only 20 in a class there would be quite sufficient time for each to receive a fair amount of explanation independently of the lecture?—Quite so. But in fact the whole class is there only till 12 o'clock, because at 12 o'clock each day there are lectures on other subjects, to which many of the men go. So also in the afternoons, only a part of the class is present.

875. (*Chairman.*) But on the whole we understand you to be of opinion that the staff of instructors is adequate and properly arranged with reference to the

assistance required by the students, and their wants are fully met?—Yes, so far as comes within my own knowledge. I speak of course entirely with reference to my own class.

876. (*The Rev. H. A. Morgan.*) Do you suppose that any of those students who come to you now, and who are so very backward when they first come, receive instruction from private tutors residing in the neighbourhood of Greenwich?—No, not in my room. I do not know of an instance of it. In other rooms, where the officers are working up for a special examination with some direct object in view—as for example, the gunnery lieutenants, who are working up with the direct object of getting a gunnery certificate—I believe they do so; but in my own room it is not the case.

877. When they are working with you, have they the object in view of endeavouring to get into Professor Lambert's class?—No, they never do that in the year; but one object that they have, perhaps the best that they have, is to come back again with some foundation, to go through the course for gunnery lieutenants. There are at the present time three officers studying as gunnery lieutenants in Professor Lambert's class, who were in my room two years ago, who worked very well indeed with me, and who passed a very creditable examination at the end of the session.

878. Had they been at sea in the interval?—Yes; they had since then been to sea, and they have now been reappointed to qualify for gunnery.

879. (*Mr. Lingen.*) Your title of "Instructor" is a title of naval service, is it not?—Yes.

880. You yourself are a naval officer borne on a ship's books?—Yes, I am borne on the books of the "Fisgard."

881. Have you been to sea as instructor?—Yes, for many years.

882. Between the time of quitting the "Britannia" and coming to the college, an acting sub-lieutenant has been six years at sea, has he not?—I think not necessarily, but I really do not know how it is now.

883. Within your own experience how long was it between a cadet's quitting the "Britannia" and his attaining the standing which would have entitled him to enter the college?—It varied somewhat, but it might be only four years.

884. It would not be less than four years?—It could not be less than four years.

885. You have had an opportunity therefore of observing the attainments of officers both at the time when they quit the "Britannia" and at the time when they enter the college?—Yes, a very full experience of both.

886. Did I rightly understand you to say in answer to the chairman that they come on board ship after leaving the "Britannia," having already forgotten a great deal of what they had learnt in the "Britannia"?—In some instances.

887. What interval elapses, generally speaking, between a cadet's quitting the "Britannia" and his going afloat?—It is ten years since I was afloat, so that I cannot really say what it is now.

888. But it is a short interval, is it not, generally?—I should say that he gets perhaps a couple of months' holiday.

889. And your experience as naval instructor is that he had already forgotten a considerable amount of what he had learnt on board the training ship?—In many instances that was the case. At the same time pray bear in mind that my experience at sea dates back to rather more than 10 years. How it is now I do not know.

890. The bearing of these questions is this, that the first question referred to us is the adequacy of the staff of instructors, and that necessarily connects itself with the attainments with which the young officers at any rate enter the college, and I want more or less to have your experience as a naval instructor to form some opinion whether any improvement might be made with the view of their keeping up their

studies during that interval. We heard from the director of studies that they pass an annual examination while they are afloat, and that those papers which they answer in that examination come up to him to be looked over, so that there is really the means at the college of observing what they do while they are afloat, and of forming some opinion as to the attainments with which they ought to enter it?—That system of periodical examinations during their time as midshipmen has been instituted since I have been at the college; that is to say since I was last afloat; so that I know little of its working, except by hearsay.

891. You have no experience of your own on that point?—No, not on that point specially.

892. It is only ships of a certain class, is it, that carry a naval instructor?—I think only ships commanded by a captain.

893. Of course it is liable to be interrupted by the exigencies of the service, but subject to those what is the course of study of the officers afloat who are under the superintendence of the naval instructor; do they come to him as individual students, or does he have them in a class, or what does he do with them?—As a rule they come to him as individual students. I should say that a naval instructor is fortunate if he can make even a small class of two or three; but my experience is that as a rule they work separately.

894. To pass from that part of the subject to your position in the college, the particular class of students that you have to instruct I think are half-pay officers, are they not, speaking generally?—Yes, speaking generally. In fact at present, with the exception of three marines, they are all half-pay officers.

895. When those officers come to the college, how is it determined whether they go into your class or whether they go in Professor Lambert's class?—By an examination.

896. Who conducts that examination?—I have done so for the last two years, but it is I suppose whoever the director appoints.

897. If an officer who is assigned to your class, after a short time shows great aptitude and brushes up his studies again, there are means of transferring him, I suppose, if it were necessary, to Professor Lambert's class?—Yes; but it never has been done. I mean that no officer has ever attained such proficiency as to render it advisable to do so.

898. Has the converse process happened that an officer told off to Professor Lambert's class has been returned to you?—Occasionally, but not very often.

899. Is there any ascertained official relation between yourself and Professor Lambert? Do you work as officers of one system in communication with each other at all, or do you work independently of him?—Quite independently.

900. So that the terms "Professor" and "Instructor" have no reference to any gradation of service within the college?—Except so far as his class is more advanced than mine.

901. But in the methods which you might adopt with your class or any course of study which you might assign to them, in taking instructions you would go direct to the Director of Studies, and not to the Professor?—Direct to the Director.

902. Mr. Solomon would take all his instructions from yourself, would he not?—Yes.

903. You hold two positions, one of mathematical instructor and also that of lecturer in meteorology?—Yes, and also in naval history, making three positions.

904. Your position with regard to those two latter subjects is somewhat different from that with regard to the mathematical subjects; is it not?—It is only as lecturer; any instruction which I may give besides, as in answer to questions, is unofficial.

905. The lectures in naval history for instance are avowedly extra lectures to the course, but the lectures in meteorology are part of the college course, are they not; that is to say, every officer must attend your lectures in meteorology?—No, it is quite optional. The lectures on history and meteorology are both

extra, and are equally voluntary for the half-pay officers.

906. Is no officer, either an acting sub-lieutenant or a half-pay officer, compelled to attend your meteorology lectures?—The sub-lieutenants are obliged to attend them, and they belong strictly to the sub-lieutenants' course. I was first instructed by the admiral to give these lectures to the sub-lieutenants. It then appeared that many of the half-pay officers would like to attend them and the course was therefore extended a little.

907. But your lectures in meteorology occur weekly and at fixed times just as much as your mathematical lectures, do they not?—Yes; but so do the others.

908. Do your lectures on naval history also occur at fixed times as part of the college course?—Whilst they are going on; it is a course of so many lectures.

909. There are lectures which are given on such subjects as these: military tactics, structural arrangements of ships, magnetism, navigation, the atmosphere as a vehicle for signals at sea, international law, and so on; and amongst those subjects occur two which you give, one on meteorology and another on naval history. Are your subjects permanent subjects in any sense in which the other subjects that I have named are not so; but, entering into the college course regularly and for certain hours, Professor Bernard, for instance, does not give six lectures on international law every term?—No; I lecture on history during one term in the session; that is to say, this session I have been giving during the present term a course of seven lectures.

910. And must all the officers who are in residence during that term attend your history lectures?—No, it is optional.

911. Is there any difference in that respect between your history lectures and your meteorological lectures?—None; but to suit the arrangements made regarding the sub-lieutenants, the meteorological lectures are repeated every term, so that the course is delivered three times in the year.

912. And those lectures are compulsory for sub-lieutenants?—Yes, for sub-lieutenants only; for half-pay officers it is optional.

913. (*Major Donnelly.*) Were those two lectures that Mr. Lingen referred to just now occasional lectures as it were, separate from the ordinary course?—They are two fixed and regular courses of lectures; but the attendance of half-pay officers is voluntary.

914. (*The Rev. H. A. Morgan.*) With regard to the special course of lectures given by you in the Easter Term, is that a separate course to the course usually given by you in Easter Term?—The course of lectures on naval history is given during one term of the session, as appointed by the director, last session, it was given in the Easter term; this session it is being given during the present term. The course of lectures on meteorology is given in each term. Both are, so far, special courses, that it is optional whether the officers go to them; they put their names down on the director's list, to go or not to go.

915. (*Mr. Lingen.*) This is one of the references to us: "What course of lectures should be given in the year, if any, beyond those delivered by the regular instructors?" I am anxious to know how far your lectures on meteorology or on naval history are either included in those delivered by yourself as a regular instructor or are beyond them?—As mathematical and naval instructor, I should not lecture on either meteorology or naval history. They are so far, I conceive, outside my province; and on that account when I was asked to undertake these lectures, I requested that a special mention of them should be made in my official title.

916. From your own experience as mathematical instructor with regard to the proficiency of the officers who enter the college, can you suggest any improvement in their course during the time that they are at sea by which they might enter it with preparation to take full advantage of the college instead of having to begin the elements of instruction over again?—Of course that goes to the great question of how you can

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send them from the "Britannia" with the best foundation. If they can be sent from the "Britannia" with a good foundation of elementary algebra and geometry, and steps are taken afloat, as I understand they have been trying to do now, to keep that up, I hope in a few years we may see a very marked benefit to the college.

917. It would make a very great difference, would it not, in the results which the college is able to accomplish with the same staff, if the officers entered it better prepared than they do at present?—An enormous difference.

918. A greater difference even than any increase in the number of the staff itself could be hoped to accomplish?—Much greater. The great difficulty is, as I have said, that we have men of mature years, coming there knowing next to nothing.

919. (*Chairman.*) The great object of the college, I presume, is to keep up and carry on the education of officers continuously from the very time that they enter the "Britannia"?—So I understand it.

920. But, to a certain degree, that object is defeated owing to the inadequate preparation with which some of the students come to the college?—That is the great difficulty that we have.

921. (*The Rev. H. A. Morgan.*) Have you ever heard those students, when they came to Greenwich, express regret that they were not able to do more in the way of studying when at sea?—Not often; they seem to look on it rather as the custom of the service.

922. (*Mr. Lingen.*) The particular preparation which you would like to make sure of, as I understand you, is not so much extended instruction, as that the officers entering should be thoroughly expert arithmeticians, and able to use the elementary processes of algebra?—Yes.

923. If you could secure that, you would think that you had made a great advance upon the present state of things?—A very great advance indeed.

924. (*Chairman.*) One of the questions referred to the committee is what the remuneration of the instructors at the college should be; do you think that things in that respect, as regards remuneration, are entirely on a satisfactory basis; you yourself are on full pay, are you not?—Yes, I am on full pay; with a special allowance of 160*l.* per annum, in lieu of tuition money; and the regulation lodging and subsistence money (91*l.* 5*s.*); in addition to which I now have an extra payment of 30 guineas for the lectures on naval history; this was first of all fixed as a fee at the rate of five guineas for each of six lectures; but afterwards, when the Admiralty saw fit to make it a yearly course, instead of a fee, it was made an addition to my pay.

925. Then the delivery of those lectures was at that time considered something which you were not bound to do?—Distinctly.

926. But for which you ought to receive some remuneration?—Yes.

927. What does your annual remuneration amount to?—Including all allowances, it is 598*l.* a year, without the 30 guineas, which are extra.

928. (*Mr. Lingen.*) Is your situation one during good behaviour or pleasure, or is it a situation for a limited number of years as a naval officer in the college?—It is at the Admiralty's pleasure; but it has always been considered permanent.

929. You are the first holder of your office, are you not?—The first at Greenwich; I was transferred from Portsmouth I had no predecessor at Greenwich; I was there at the first opening. We opened on the 1st of February 1873. My appointment to the "Fisgard" the 26th of January of that year.

930. Might it be considered generally that the gentlemen who in the lists of the college staff are put down as instructors, although that title denotes their naval rank, are still as permanent officers of the college as anybody else, and is that the general understanding, or that they are only there until they go afloat again?—The understanding is that they are there permanently; but you will notice that many

of those who are down in the Navy List as instructors do not belong to the service, and are not naval officers at all.

931. (*Chairman.*) They might be clergymen, for instance, might they not?—Yes, many of them might; they need not, at any rate, be officers belonging to the service; Mr. Solomon, for instance, has been recently appointed, I suppose permanently, or at the Admiralty's pleasure; but he does not belong to the navy, or at least if he does, he is a civil servant; he is not a naval officer.

932. (*Mr. Lingen.*) Then are we to understand that in the college staff the title of instructor may simply mean a gentleman who teaches, or it may mean the title of a naval officer; or are all of those who are upon the college staff naval officers?—My impression is that it is used in both ways.

933. Then besides yourself, who are a naval officer, there are three instructors in nautical astronomy and navigation?—Those are all naval officers.

934. May the same be said of the three instructors in mathematics?—They are not.

935. In fact the title is two-fold and somewhat ambiguous?—The particular title that I have, of mathematical and naval instructor, was first conferred many years ago, as a mark of distinction, upon the naval instructor who was appointed to the "Excellent" in charge of the officers qualifying for gunnery; it was that particular position which I held at Portsmouth, and the title stuck to me when I came up here. I spoke to the Admiral, a few months ago, about an anomaly that Mr. Lambert and I should have distinct titles, although our work was essentially of the same nature; but he seemed to think it was a point to be left for the consideration of this Committee, whose appointment was then pending.

936. (*Major Donnelly.*) Had you formerly the class, which now goes to Mr. Lambert, of officers qualifying for gunnery lieutenants?—Yes. Mr. Lambert now adds to that a certain number of half-pay officers.

937. (*The Rev. H. A. Morgan.*) Do many of the officers who attend your classes remain under your tuition the whole time that they are at college?—Yes; all who join my mathematical class.

938. Is it the case that a considerable number of those gentlemen leave the college at the end of their course with only a very moderate acquaintance with such subjects as algebra, geometry, and so on?—Yes, a considerable number; but the report of the last examination, which I presume has been put before the committee, would almost answer that question better than I can.

939. Do they leave your class with such a knowledge as you yourself would consider satisfactory?—Many do not. I think if you were to look at the last year's report of the examination, you would see the names of several officers who were there the whole session, whose knowledge of mathematics, from the number of marks that they obtained, must have been extremely limited.

940. (*Chairman.*) Have you anything further to say with regard to the remuneration of the instructors?—At the time that I was appointed "Lecturer in Meteorology," I represented to the Admiralty that these lectures were extra, beyond my appointment as "Mathematical and Naval Instructor," and requested that some additional allowance might be granted me for them. This the Admiralty did not then see fit to grant. I think also, that the allowance made for house rent (63*l.* 17*s.* 6*d.*) is too small; more especially considering my seniority and relative rank in the service, and the high rate of rent at Greenwich. In January 1873, when I was appointed to the college, I pointed out to Sir Cooper Key that the transferring me from Portsmouth to Greenwich—which might be considered a species of promotion—was really lowering my income by 40*l.* a year, the difference between the rent which I had to pay at Greenwich and at Portsmouth. Sir Cooper did not, however, think it advisable to bring the matter forward at that time; and nothing has since been said about it.

941. Without reference to your own particular case, have you anything to say as to the remuneration of the instructors?—No. I have given no thought to the subject, but I believe, speaking generally, that the table of salaries is satisfactory.

942. (*Mr. Lingen.*) Then we are to understand that the title of instructor and professor implies no necessary connection or subordination between the gentlemen who hold the one title or the other. Are they both in their degree subject only to the director of studies, or are the instructors in any degree under the instructions and directions of the professors?—Some are, some are not; I myself and Mr. Oborn, who is also a naval instructor, have each the entire charge of our respective departments, under the director of studies only.

943. Then in the case of those officers of the college who do not bear the naval rank of instructor, is there any reason why they are called instructors instead of lecturers or assistant professors, or some title that would imply a connection with the course of studies in the college rather than with naval rank?—I know of no reason why they should not be; their work is rather work of instruction than anything else.

The witness withdrew.

THOMAS S. OBORN, Esq., R.N., examined.

948. (*Chairman.*) We understand that you conduct the instruction of the acting sub-lieutenants and the acting navigating sub-lieutenants in the college?—Yes, and of candidates for naval instructors.

949. Is that in mathematics only, or in other subjects?—I have the arrangement and carrying out of the entire routine, and do the nautical work. Two other naval instructors teach the pure mathematics.

950. The number of those students varies very considerably, does it not?—It is pretty even just now; it has varied very much in the last two or three years, from 106 to 48; at present the number is about 61, and I think, from recent Admiralty regulations, that will be about an average.

951. Is the staff of instructors sufficient for that number?—Perfectly, I think.

952. But it would not be sufficient, would it, if you had 75?—Yes, provided no instructor had more than two classes to instruct. A new class comes to the college each month. It is easier to work a single class of 40 or 50, than two classes of 20 each. The work of three classes, however small their numbers, I have always found more or less unsatisfactory.

953. Who assists you with regard to the mathematical instruction?—Two naval instructors, Rev. Mr. Davies and Mr. Silver. We work in three separate rooms. Of the twenty-five weeks the officers are at the college, eight are allotted to algebra and geometry with Mr. Silver, eight to trigonometry, mechanics, dynamics, and hydrostatics with Mr. Davies, eight to navigation and nautical astronomy, and the last week to general revision with me. Instruction goes on as may be seen by the routine, in physics, steam, French, and nautical surveying during the whole period.

954. In what state of knowledge do you generally find those acting sub-lieutenants when they come before you; do they seem to have forgotten what they ought to have known, or to have retained it, or to have improved upon it?—I think, speaking in a very general way, they have forgotten everything nearly, but of course there are many exceptions. Taking the test examination, and being guided solely by the numbers shown at the test examination, I think I might say generally that they have forgotten everything.

955. Even although they have been examined twice every year while at sea?—That system of examination has not been in force sufficiently long to enable me to draw any inferences, the results of it can scarcely be said to have shown themselves for more than two

944. Generally speaking, an officer of a school or college who lectures on the lower subjects does so in some relation to another officer who lectures on the higher subjects, and you would expect to see some connection between the two; that connection, as I understand you, is supplied solely and simply in the director of studies?—The work of the different rooms is quite independent, and the officer in charge of it receives directions only from the director. Mr. Solomon assists in my room, and the instruction which he gives is under my superintendence.

945. But he does not bear the title of instructor, does he?—Yes, I think he is in the Navy List as mathematical instructor.

946. In the college list is he down as mathematical instructor?—I think he is so styled in the Navy List. Mr. Gleed acts in the same capacity with respect to Mr. Lambert.

947. Some of the instructors are assistants to particular professors, and other instructors are not so assistants; is this the case, that yourself and Mr. Oborn are instructors who are not assistant to any professor?—Yes, that is so.

years. The men we have at the college now have been five, six, and seven years in the service.

956. I presume that you set those students, when they come to you, the same papers as they are supposed to have passed on board the "Britannia" when they were about 15; do you think that they could do more?—No they cannot, and they do not. The papers given are examination papers for the rank of lieutenant.

957. They could not do now what they did then?—No, at least they do not do it.

958. (*Mr. Lingen.*) Have you had the means yourself of seeing any of the papers worked by the "Britannia" cadets on quitting the "Britannia"?—I conducted the examination in the "Britannia" two years ago for Dr. Hirst.

959. So that you have seen each end of the period of the cadet who leaves the "Britannia," and the acting sub-lieutenant who comes into the college?—I can only speak from intimate knowledge of it on one occasion, but I have known cadets go direct from the "Britannia" afloat for many years, and I cannot say that I thought they came up to the standard that the papers indicated even then; I thought the papers were of a higher standard than what I found their attainments to be when I came to know them.

960. That was your experience as an instructor afloat?—Yes.

961. But when you conducted the examination yourself for Dr. Hirst what was your opinion?—Then I was very much pleased with it. I certainly thought that the boys did exceedingly well.

962. Better than your experience afloat would have led you to anticipate?—Yes, more particularly as shown in the *vivâ voce* part of the examination.

963. What was the interval between your experience afloat and your conducting this examination on the "Britannia"?—Four years.

964. And in that time it is fair to suppose that some change might have taken place in the course of studies in the "Britannia"?—I think so, I perceived a great improvement a few years before when the examination began to be conducted by outside parties instead of by the "Britannia" staff. The examination for many years was conducted by the staff of the "Britannia."

965. (*Chairman.*) That was changed about 1863, was it not?—About then; but changes were made from time to time after that.

966. (*Mr. Lingen.*) And you think that was productive of a decided improvement?—Certainly; unmistakably; I think.

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967. (*Chairman.*) What the Committee have to consider is, whether, having regard to the course of study in the college for the various classes of officers, the staff of instructors is adequate and properly arranged with reference to the assistance required by the students; in considering that question, of course it is important to ask what the state of knowledge or ignorance of the students is when they come to you; if they know more, they require less assistance, and if they know less, they require more assistance; but looking at the students as they are, is the staff of instructors adequate now?—I think quite so at present.

968. Taking them as they are, as a matter of fact you consider that it is so?—I think so.

969. (*The Rev. H. A. Morgan.*) Do you find that those officers who serve on board our large ships in the Mediterranean and the Channel Fleet, and the flag ships in foreign stations, where they have proper naval instructors on board ship, come to Greenwich better prepared than those who have served in small ships, where there is no naval instructor?—Yes, on the whole I do; but at the same time I find a great many of the better informed officers come from small ships, having got appointed to those small ships themselves, on account of the greater comfort and their better position as officers, and they have kept up their work at the same time as best they could.

970. They have more work, have they not, when they are out in small ships on distant stations?—Yes; much more; they learn seamanship better, and they are entrusted with the duties which officers of superior rank only perform on board larger ships. There is every attraction to a youngster to seek a small ship.

971. (*Mr. Lingen.*) That is in the way of naval experience; would you also say that he has more time for study?—On the contrary, he has less; but still a great many of those who would work under any circumstances are the very characters who seek the small ships, and would be anxious to learn under any conditions.

972. (*Major Donnelly.*) They are the most energetic officers?—Just so; and it is for that reason that that comparison is scarcely fair; but taking it altogether, I certainly think that those who have been in big ships, show better groundwork than those who have passed much time in small ships.

973. (*Mr. Lingen.*) Would your experience lead you to say, that in the interval between the "Britannia" and the college it is desirable to ask a naval officer not to extend his studies, but to keep up the mathematical part of them?—At the present time I would say "keep up only." I would like to see it extended also; but as things are just now, I think I ought to be content with saying "keep up only."

974. If he only kept them up, clearly it would be a great improvement upon the present state of things?—Certainly; and any one who kept up even what is required by the third class certificate on leaving the "Britannia" I think might pass the examination at the college easily.

975. Does your experience lead you to think that it might be worthy of consideration whether there should be a rejecting examination for entrance to the college in the case of acting sub-lieutenants?—Perhaps I might be allowed to ask whether I am to understand by that that an examination on joining the college should turn a man out of the service?

976. No, my question pointed to this, at present a man comes into the college, whatever he may know or whatever he may not know, but at the end of his course, after two trials, he is liable to be turned out of the service at the second failure. The object of my question was whether it would induce officers while they were at sea to keep up their studies if they were liable, if they did not succeed, we will say on two occasions, to be refused entrance into the college, possibly they might be allowed to enter still on a third trial, but if they lost rank or precedence, or something of that kind, which gave them a kind of warning that

the college course was a serious one which they had to prepare for, would any change of that sort be feasible in your opinion?—I fancy not. I do not take to that at all. It seems to me that it would be unjust considering the varied circumstances in a naval officer's career previous to that. I think it would be unfair to many because they make up at the college for what they have lost.

977. (*Major Donnelly.*) Do you mean that circumstances are often so much against a man during his early naval service?—Yes, two men may start equal from the "Britannia," the one may serve entirely in small ships and have no chance of instruction in any way, the other may go the whole time in large ships.

978. We understand that there is some chance of instruction in a small ship, the navigating officer is supposed to give instruction, is he not?—Yes; it often happens, however, that the navigating officer has no inclination to do that kind of work. I think it is the duty of the naval instructor in a large ship to get officers from small ships to come for instruction to him when they are present with the flagship on the station. I have done that frequently, and have found them always very ready to accept the opportunity I have had to teach as many as 17 or 18 from five or six small ships in a large ship on a station.

979. (*The Rev. H. A. Morgan.*) Can you do that when they are scattered about?—I am speaking of ships present with the flagship; there are very often one or two small ships present with the Admiral for two or three months probably; it is seldom that the flagship is alone.

980. (*Major Donnelly.*) I understand that your objection to an entrance examination at Greenwich is that a naval officer might be put in such circumstances that he really could not carry out his instruction to any useful extent whilst he was afloat?—That is it; but still he will manage to pass his examination all right with the course of study at Greenwich.

981. (*Mr. Lingen.*) If the present examination of officers afloat should be effectually carried out they will answer to some extent the object of an entrance examination, will they not?—Certainly.

982. Do you anticipate benefit in that direction from the establishment of these examinations?—Yes, much, and I perceive it, I think, already. I think there are clear indications of improvement in the test examinations on entry in the last four months. At any rate, they are better, and I can attribute it to no other cause.

983. Have you yourself observed the examination papers that are sent out to the young officers?—I have.

984. Are you satisfied with them as being no more than it is fair to require of an officer who has his naval duties to perform?—I do not think they are. I may perhaps take exception to an occasional paper, or to a question here and there, but taking the papers on the whole, I think they are very fair, considering that they are for officers from the time of their going into sea-going ships up to passing at the college.

985. (*Chairman.*) The papers are sent out, I suppose, to the captains of vessels?—Yes, they are sent to the captains under seal. The captain opens them on a certain day, and sets the youths to work on them under supervision.

986. (*The Rev. H. A. Morgan.*) When those sub-lieutenants who have served on small ships come to you, have you heard them express regret that they have not had better opportunities of obtaining instruction when out in different parts of the world?—Often; but it is a regret felt only then for the first time when they see what they have before them, when they become sensible that the time allowed them at college is probably too limited to enable them to do more than barely qualify for their examination.

987. Do you find them on the whole industrious and anxious to obtain as much instruction as they can under you?—Whilst under me very much so. They work very hard and are most tractable in every way, but I do hear complaints of some not working well the first two or three months after joining.

988. The studies that they would then have to undertake being necessarily dry, such as algebra and things of that sort?—Yes.

989. The subjects that you would teach them would be more interesting, would they not?—Yes, very much so, and about which they must necessarily know something, even although it is merely a mechanical knowledge.

990. In fact, it would be far better if the mathematical part of the groundwork was got over as much as possible before they come to Greenwich?—Yes, and those examinations, I think, are tending to do that.

991. Mr. Laughton has told us that many come to Greenwich exceedingly ignorant of mathematics?—Yes, very much so.

992. (*Mr. Lingen.*) The officers that attend him would be generally senior to those that would fall under your supervision, would they not?—I should think three fourths of them are just senior and that is all, having just been promoted. The Admiralty encourage lieutenants on promotion to go to college, and I think expect all to pass a session there before being appointed to a ship.

993. (*Chairman.*) With respect to the remuneration of the instructors, which is one point to which our attention is directed, do you think, looking at it as a whole, that the remuneration is on a proper scale?—A tuition allowance of 250*l.* per annum is received by the senior naval instructor in the “*Britannia*,” 200*l.* by the second senior, and 125*l.* by each of the other naval instructors. Mr. Laughton and myself receive 160*l.* each, and Mr. Davies and Mr. Silver 100*l.* each. I see no reason why Mr. Laughton and I should have less than even the second naval instructor in the “*Britannia*,” or Mr. Davies and Mr. Silver less than the others.

994. There are a number of lectures given which are not included in the regular course of study as laid down; do you give any of those lectures?—I give lectures on navigation and nautical astronomy.

995. Do you give 30 lectures on nautical astronomy?—I give thirty lectures on nautical astronomy to every class of sub-lieutenants.

996. Are those lectures all outside your regular work?—No, they are my regular work, but all the other students besides those who attend with me regularly can attend them, having given in their names to the director of studies.

997. (*The Rev. H. A. Morgan.*) Do you give those 30 lectures every term, because it is stated that you give them in Easter Term?—That is for officers other than the class of those studying navigation, that is to say, than the sub-lieutenants. They attend with the sub-lieutenants. I am always giving those 30 lectures.

998. Is it during Easter Term only that they are open to them?—Yes, only during Easter Term, except that last year it was in two terms, Easter and Midsummer.

999. Then they are not extra lectures. They are just the lectures which you give in the term, the only difference being that there are a greater number of officers coming to them than to the others?—That is all.

1000. (*Chairman.*) When you were appointed, did you understand that you would have to give those lectures?—No, I understood that I was to do the entire nautical work of the college, whatever form it might take.

1001. And do you consider that those 30 lectures are a part of that work, and not outside it?—I do, but I have to give lectures on navigation, &c. because of the peculiar manner in which the sub-lieutenants join, twice a day.

1002. Is that because they join irregularly?—Yes, and to carry them through the course in the six months study allowed at the college it is absolutely necessary for me to give two lectures a day on nautical astronomy, which take me away two hours a day from instruction on four days in the week.

1003. What time of the day are those 30 lectures given?—From 9 to 10 and from 2 to 3.

1004. Does anybody attend them except the sub-lieutenants?—Yes, not now, but usually after they have gone through a course of mathematics, either up to Christmas or to Easter, perhaps some 50 or 60 captains, commanders, and lieutenants.

1005. You do not receive any special payment in consideration of those lectures?—No, nothing.

1006. So that they may be really considered as part of your regular work?—I think so.

1007. (*Mr. Lingen.*) Have the acting sub-lieutenants who studied navigation under you, between one lecture and another, exercises and problems set them to work?—The whole of the remainder of the day, except that taken up with French, surveying, &c., is devoted to working up the lecture of that day.

1008. With regard to those 30 lectures which you give to the larger audience, no individual instruction follows those lectures?—None, only that I have a paper of exercises, problems, &c., written out so that they can take the work if they like, which the sub-lieutenants are bound to do, and I invite them all to come to me for assistance, and many do.

1009. Supposing a half-pay officer, who was attending the college as a voluntary student, wanted to strengthen himself in navigation, could he get into your classes?—The sub-lieutenants would not look favourably on him. He does do so, but he is rather an interloper.

1010. Is that from a professional feeling that he is a senior coming amongst juniors?—No; simply that he is occupying time that belongs to them.

1011. And that he is supposed then to have all the navigation that he requires when he goes into the college, and that he has no business to come to the college for navigation?—No, not that, but that he is supposed to get assistance from Mr. Laughton in Mr. Laughton's room.

1012. Does Mr. Laughton lecture on navigation?—No.

1013. But supposing that any of his pupils want navigation, in point of fact, they get what they can either from Mr. Laughton or from you in a sort of irregular kindness?—Yes; but they can get from Mr. Laughton all they want, and they do.

1014. (*Chairman.*) You have nothing to do with the examination of students who are under your instruction?—Only with the observations taken by them whilst they are at the college. Admiral Key wished me to do it. I examine the sights taken by the sub-lieutenants for their final examination during the time they are under examination.

1015. I suppose from your position nobody could do it as well as yourself?—I am favourably circumstanced for getting the data and checking the mistakes in that way. Of course others could do it, but I think perhaps I am more favourably circumstanced than any one else for doing that duty.

1016. If a man fails he is not examined at the next examination, but the next but one, is he not?—The interval is either six weeks or seven weeks between his first failing and his going up again.

1017. Do you ever notice that great improvement takes place in that interval?—Yes.

1018. Are they capable of making up lost ground very much?—Yes, they are. Of all the failures that have occurred, I certainly think that seven-tenths would never make up the ground required, whatever the interval given them to prepare might be.

1019. That they are incapable?—Yes, and from various causes. There certainly have been two or three who have worked well, and in whose favour much might be said, who have failed to qualify.

1020. Mr. Goodwin conducts the examination, does he not?—He does.

1021. Do you think that many acting sub-lieutenants receive private tuition in addition to what they get from you?—Many of them, and I dislike it much.

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1022. Do you discourage it?—Yes, in every way. It hampers me very much.

1023. Who are the persons who give that private tuition?—I do not know at all.

1024. (*Mr. Lingen.*) Even as a matter of fact you do not know who they are?—I only know one who is a naval instructor retired, and who does a good deal of education work still for the Admiralty. He takes one or two pupils. I know him from having known him previously.

1025. (*Chairman.*) You do not think that the fact of some of them resorting to private tuition proves that private tuition is wanted?—It is not wanted; on the contrary, I would much sooner that they did not have it.

1026. (*Major Donnelly.*) In what way do you mean that it hampers you?—Instead of following the proper course of study they are disposed to work at whatever is set them by their private tutor, and I have often seen indications that that is rather following a course of examples taken from examination papers instead of from the text book, or doing the subject properly, and often I can see that their attention is off from the lectures and the work of the class room, and on that set them by the private tutor.

1027. (*Chairman.*) I suppose that the private tutor studies the papers for the last two or three years, and has his own notions of the periodic recurrence of the questions, and sets them accordingly?—I suppose so, but I dislike it very much, and would be very glad to see it given up if it were possible.

1028. (*Mr. Lingen.*) You think that it is unnecessary for a student of ordinary diligence?—Quite; I feel perfectly sure of it, because there have been instances of men passing creditably who did badly at their entry examination, and who had not any private tuition whatever.

1029. Do you think the time of the course too short?—I would like it longer, and I would like to do more; but I think, considering everything, it is as long as it should be just now.

1030. As long as can be afforded?—Yes, I think so. It is not long enough for us, perhaps, to do some things so thoroughly as I would like.

1031. (*The Rev. H. A. Morgan.*) What subjects have those sub-lieutenants to read during the course?—They go through algebra, as far as the binomial, not including it (only the best men do that, and they do it in the most general form); trigonometry, plane and spherical; geometry, the six books; mechanics, (very elementary), dynamics, hydrostatics, navigation and nautical astronomy, physics, French, steam, nautical surveying, winds, and currents.

1032. Have they to do all this in six months?—Yes; I would have you understand when I say that they know nothing on joining, a great deal comes back to them. It is a very different matter teaching men like that, and teaching any one who had not studied the subjects before.

1033. Do you take those subjects progressively, or do you take several together?—Progressively; algebra, geometry, and trigonometry first. Then they themselves keep these going all through. I find men up to the last moment working algebra, trigonometry, &c.

1034. Do you give them papers on them?—Yes.

1035. (*Mr. Lingen.*) I understand you to say that the length of the college course is as great as the exigencies of the service will permit, but that there is room for improvement, or at any rate, for hoping for improvement in the officers keeping their studies up better between the time of quitting the “*Britannia*” and entering the college?—That is exactly as I would put it. I certainly look that we shall be able, without their perceiving it, to raise the college work in the course of two or three years. I see clear indications of it already. I have been disappointed in not perceiving it before. I thought when the college was first started, that about 18 months would have been sufficient; but three years have elapsed, and I am only just beginning to see it now; but still I am seeing it.

The witness withdrew.

Adjourned to Friday next.

At the Royal Naval College, Friday, 24th November 1876.

PRESENT :

THE REVEREND O. GORDON, B.D., IN THE CHAIR.

The REVEREND H. A. MORGAN, M.A.

R. R. W. LINGEN, Esq., C.B.

MAJOR DONNELLY, R.E.

C. D. LOVELESS, Esq., Secretary.

Acting Sub-Lieutenant A. examined.

*Acting Sub-
Lieutenant A.*

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1036. (*Chairman.*) You are an acting sub-lieutenant?—Yes.

1037. And you are here studying for your examination?—Yes.

1038. How long have you been here?—I have been in regular study since last March. I went away from ill-health last October, and I entered last March in the regular course.

1039. How long had you been at sea after leaving the “*Britannia*” before your coming here?—I left the “*Britannia*” in 1869.

1040. In what ships were you?—I was in the “——” six months, then in the “——” eighteen

months, and in the “——” four years and nine months.

1041. Did you come straight from your ship to this college?—No; I went to the “*Excellent*” for three months.

1042. Did you come here straight from the “*Excellent*”?—Yes.

1043. What stations were you on during that time?—The East Indies the whole time.

1044. Was there a naval instructor on board?—No.

1045. Not on any of those ships?—No. I used latterly, the last three or four months, when I met

the flagship to go on board her to school, but it was only for a short time.

1046. Where was the flagship?—At Trincomalee.

1047. How long were you on board the "Britannia" before you went to sea?—I was there for eighteen months altogether, and three months in hospital.

1048. Did you pass out in the first or the second class then?—No, I passed out third.

1049. Is that the lowest class?—Yes; it was then.

1050. From that time till you came on board the "Excellent" had you any instruction whatever?—With the Channel Fleet in the "——" we had a naval instructor.

1051. How long were you there?—Eighteen months.

1052. Then you had a naval instructor there?—Yes.

1053. Is that the whole of the instruction that you had during the time you were at sea?—Yes, except what I used to do myself.

1054. (*Mr. Lingen.*) And the short time at Trincomalee?—Yes.

1055. (*Chairman.*) Had you any examination papers sent you out while you were on board?—Yes, I had some sent me. Two years ago last July they arrived. That was the only occasion.

1056. Did you answer those papers?—Yes.

1057. Do you know whether you answered them well or ill?—I am not certain which. I came out about 120 on the list.

1058. How many studied, do you remember?—I do not know. They were the whole of the midshipmen in the service at the time.

1059. What was that examination in?—In all the branches that we have here.

1060. Do you remember what your examination was when you left the "Britannia," the final examination?—Yes.

1061. Were you examined in algebra, arithmetic, Euclid, trigonometry, history, and Scripture history?—Yes.

1062. In English literature?—No.

1063. Were there not some professional subjects, such as navigation?—Yes.

1064. Anything else?—Yes, French and drawing.

1065. Did you find that you retained your knowledge on those subjects all the time you were at sea, and did you bring your knowledge with you to this college?—No; navigation and nautical astronomy were the only things that I remembered.

1066. You had to practise those to a certain extent on board?—Yes, we had not to go so far in the "Britannia" then.

1067. But did you remember the other subjects, Euclid, algebra, trigonometry, and so forth?—No.

1068. Do you consider that you had to begin those subjects again when you came here?—Yes, quite.

1069. Do you find the system of instruction here sufficient to bring you on in those subjects?—No.

1070. In which subjects particularly do you feel the want of any further instruction than is provided in the college?—It is generally so. We cannot keep pace with the instructors.

1071. How many have you in your class who are instructed together?—In the class that I am in now I think that there are 10.

1072. Who instructs you there?—Mr. Oborn.

1073. In what subjects?—In nautical astronomy and navigation.

1074. Can you keep pace with him?—No, not at all.

1075. In fact generally you find that you want further assistance than that provided for you in the college?—Yes.

1076. How many hours a day are you engaged in the college in study?—We go from nine o'clock to a quarter to one, and then from two o'clock to four.

1077. That is the whole time that you are really engaged in the college; have you nothing to do in

the evenings?—I work myself, but that is the time that I am bound to be in college.

1078. As you say you want further assistance I suppose you get it from a private tutor?—Yes.

1079. What does he teach you?—He takes me in the subject that I particularly want.

1080. How many hours a day are you with him?—I have been taking him for two and three hours.

1081. What time of the day?—I used to read two hours before breakfast, and two hours in the evening.

1082. At what time is your breakfast?—It commences at eight, and goes on till a quarter to nine. I used to read in the morning from half-past seven till half-past eight, in the evening from half-past seven till half-past nine.

1083. Are you alone with him, or does he take other pupils?—I am by myself absolutely.

1084. What are his charges?—3s. 6d. an hour.

1085. So that if you are with him for three hours that is 10s. 6d. a day?—Yes.

1086. And you pay him that?—Yes.

1087. Are there many acting sub-lieutenants who require the same assistance do you think?—Yes, most of them.

1088. Do you know how many acting sub-lieutenants there are in the college at the present time?—No; I think there are about 55, but I should not like to say for certain.

1089. And you think that most of them, if they do not want, at all events get private assistance from private tutors?—Yes.

1090. Who are the private tutors generally, are they officers of the navy?—No, I do not think so.

1091. Are any of them clergymen?—No. There is one, a Mr. Fowler, who I think was in the navy.

1092. Supposing that you came up knowing more, should you want a private tutor in that case do you think?—No, I do not think I should; it depends upon what certificate one is working for.

1093. You know something of the examinations here of course?—Yes.

1094. You have been through one examination have you not?—Yes.

1095. Was that much more difficult than the examination which you passed on board the "Britannia"?—Yes, there was no comparison.

1096. You have not seen any of the "Britannia" papers, have you, within the last two or three years?—No.

1097. So that you cannot tell whether the papers which they have here are any more difficult than they are at present, or were two or three years ago in the "Britannia"?—No, but they are very different to what they were when I was in the "Britannia."

1098. But supposing young gentlemen were brought up to a higher point on the "Britannia" and were enabled to retain the knowledge which they had acquired there on board the ships in which they served, do you think that they would still want private tutors?—It depends upon what ships they would go to, I think, to a great extent.

1099. (*Mr. Lingen.*) Do you attend other lectures besides Mr. Oborn's?—No, I do not now. It is voluntary now, because I have been plucked once, I must attend the physics lectures.

1100. My questions will all have reference to the period before you were examined, and while you were studying; during that time had you other lectures to attend besides Mr. Oborn's?—Yes.

1101. Does Mr. Oborn take charge in any sense of the acting sub-lieutenants? is he responsible for their instruction, or are there any other professors whose lectures they attend?—I think he makes out the routine on which they are to go, or anything like that.

1102. In the class which you attended I think you said there were 10?—There are 10 now; in the class that went up with me the other day there were only four.

1103. When you were studying as an acting sub-lieutenant in the classes that you then belonged to,

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was 10 the ordinary number?—No, there were only four of us there; there are 10 of us in the class that I am in now.

1104. When there were only four in the class, do you still think that you did not get sufficient individual instruction?—Yes; some men are much cleverer than others, and they can go faster. We cannot expect the instructor to wait for us slow coaches.

1105. Between the lectures of Mr. Oborn, or whatever other professor's lectures you attended, especially if the classes were not more numerous than 10 or 4, he must have had plenty of time to answer all questions?—Mr. Oborn lectures us for an hour, supposing it is nautical astronomy. We have so much to get through. Then we go up into the study where the other class is. In the meantime the other class have worked up their work, and they bring up their work as well as ours. There are two classes there.

1106. Although there were only 4 or 10 in the class, when you got into the room where the private instruction was given, if I may so call it, there you encountered a greater number?—Yes.

1107. The actual time per day which you describe, from 9 to $\frac{1}{2}$ to 1, and from 2 to 4, makes, I think, $5\frac{1}{2}$ hours a day, and you also said that you have private lessons for $3\frac{1}{2}$ hours more; that makes altogether upwards of 9 hours a day; did you work 9 hours a day during the greater part of the time that you were acting sub-lieutenant here?—Yes, I have worked that ever since I have been here. I did not take the private tutor on for two months after I came here.

1108. But for four months of your time, that is, for two thirds of the whole period, you were working nine hours a day?—Yes, but I did not take the tutor on for three hours till the last eight weeks of my time.

1109. At what period of your time did you first begin to take him on?—Last May.

1110. When you did take him on at all it was for three hours?—No, not at first; only for the last eight weeks.

1111. In the latter part of the time when the work amounted to nine hours a day, and before that time when it must have amounted to nearly seven hours a day, did you find it very hard work?—Yes.

1112. And you think that it would have been quite impossible, with the amount of knowledge that you came up with to the college, to have hoped to succeed without the assistance of this private tutor?—Perfectly impossible.

1113. (*Major Donnelly.*) When you say that the class consisted of 4 or 10, it was really a sub-division, as I understand you, of a larger class?—No, we come up as we join. We have to join here on the second of the month, and only four of us happened to join in March. We were put in a class together, and we stuck together right through, but now, being turned back, I have gone back into a class with 10. There are 10 of us going up next month.

1114. During the morning attendance, the 10 that you are with now, or the four that you were with before, are under one master with two or three other such classes?—Yes, each master has two classes.

1115. For instance, at the present time how many sub-lieutenants is the mathematical master teaching?—Under Mr. Oborn I think there are four in the other class. There are fourteen, all of us in my study where we are at present.

1116. In what course of study do you find the greatest necessity for assistance from the instructor to carry you on?—In trigonometry and mechanics.

1117. In the mathematical portion?—Yes.

1118. Not in navigation?—No. Some of the things in nautical astronomy are hard, but it is the mathematics chiefly.

1119. (*Mr. Lingen.*) You said, I think, that those who came up at the same time were put into the same class; was that so?—Yes, we are all four in the same class.

1120. And you remain together in the same class throughout the course?—Yes.

1121. But the four that happened to come up together may be of very different attainments, may they not?—Yes.

1122. Is no attempt made to classify the men as they come up according to their attainments, and to put those who are more advanced together, and those who are less advanced together?—I do not know if they divide the big classes up; they may. If they divide them at all it is only for the steam and when you go to Captain Johnson, the Instructor in Nautical Surveying, but certainly not for the studies that I pass.

1123. So that the same four, quite irrespective of the fact of their being at such very different stages, would go through the same lessons throughout the six months that they were here?—Yes.

1124. (*Chairman.*) Just take an instance; suppose that one sub-lieutenant came up not knowing how to work a simple equation, and that another came up at the same time knowing how to work quadratic equations, would they be instructed together?—Yes, they would be put into the same study and do everything together.

1125. Could you do simple equations when you came up?—I might have been able to do very simple ones, but that would have been all.

1126. Not quadratic equations?—No.

1127. Did you know the First Book of Euclid?—No. In the "Britannia" it is all cut out.

1128. (*The Rev. H. A. Morgan.*) The subjects that you say you require most instruction in are trigonometry and mechanics; do you think that that is the case also with regard to the other sub-lieutenants, that they require most instruction in those subjects?—Yes, and they pay better in examination; they are easier to learn.

1129. Is the instruction received in this college in those subjects not as satisfactory, for instance, as what you receive in nautical astronomy and so on? do you find that you get less attention paid to you in those particular subjects?—No, we receive just the same attention.

1130. In fact there are more difficulties in them?—Yes. And you forget them so; going on from study to study, and passing in a number of subjects, taking one month one subject and one month another, and so on.

1131. With the help which you receive from a private tutor do you find that you get on tolerably well?—Yes.

1132. Have you often in class had difficulties which you wished to have explained by the instructor present, and yet have found that you have not been able to ask him to explain those difficulties because there was no time or opportunity?—I have often gone up and asked him to explain a thing, but I have not liked perhaps to keep the other officers waiting, and so I have said I understood it although I have not really understood it.

1133. (*Chairman.*) In such cases I suppose you did not feel justified in taking up more of his time when there were others waiting for the same purpose?—Just so.

1134. When is your next examination?—It commences on the 20th of next month.

1135. Have you been told what you failed in previously?—Yes; they show you your marks.

1136. (*The Rev. H. A. Morgan.*) Do you find that your health stands nine hours work a day?—Yes.

1137. But do you sometimes get rather muddled after working nine hours a day?—Yes, I do. I ought to have mentioned that I came home in the "—" and I had instruction in her. There was a naval instructor in her, she being the flag ship. I think we were about two months coming home.

1138. Did not you say that when you came here first you could not work a simple equation?—I might work a very simple one, but when I left the "Britannia" I could not at all.

1139. Since you have been here have you often regretted the want of instruction on board the ships

that you have been in?—Yes; I should often have liked to keep it up, but I could not do much myself.

1140. You often wished to keep it up when you were out in distant stations, and had no opportunity of keeping up what you knew?—I should have liked to

keep up some things, other things I did not care about.

1141. Would you have had time to work in those different subjects when you were out in those ships?—No, not when I was out there.

The witness withdrew.

Acting Sub-Lieutenant B. examined.

1142. (*Chairman.*) You are an acting sub-lieutenant, are you not?—Yes.

1143. And you are studying here for your examination?—Yes.

1144. How long have been here?—Rather over three months.

1145. When did you leave the "Britannia"? In 1870.

1146. What ships have you been serving in since?—The "Trafalgar" sea-going training ship, the "—" on the West Coast of Africa, and the "—" in the Channel.

1147. In the "Trafalgar," I suppose, you had a naval instructor?—Yes.

1148. But not in the "—" ?—In the "—" we had a naval instructor part of the time.

1149. In the Channel fleet, how was it?—In the Channel fleet we had an instructor.

1150. Then the most of your time at sea has been passed under instruction?—Yes; but at the same time, on the West Coast of Africa, where I was during the whole time that the Ashantee war was going on, the school was merely nominal. We had an instructor, but it was of no use.

1151. (*Mr. Lingen.*) Were you serving on shore at all?—Only for a few days at a time.

1152. (*Chairman.*) In what class did you pass out of the "Britannia"?—In this work I passed first class.

1153. That is to say you got 700 marks out of 1,000?—Yes.

1154. What do mean by "in this work"?—I mean in the study. In seamanship I took a second class, and in good conduct "very good."

1155. Did seamanship, then, form a part of the final examination on board the "Britannia"?—Yes.

1156. And was counted for a class?—Yes.

1157. Is that the case now?—No, it has been altered since then.

1158. There is a prize for seamanship now, is there not?—I do not know.

1159. But it does not form part of the final examination?—No, not at the present time, I think.

1160. Were you able to keep up, while at sea, the knowledge which you obtained on board the "Britannia"?—No, not after leaving the training ship.

1161. Did you bring that knowledge pretty complete here?—No, certainly not.

1162. Did you remember your algebra?—No, not at all. The only thing that I remembered was navigation.

1163. I suppose in that you had some practice on board ship?—Yes.

1164. But you did not remember your algebra or your Euclid?—No.

1165. Or your trigonometry?—The practical part of trigonometry I did.

1166. Were you examined in physics on board the "Britannia"?—No, we did not learn them.

1167. So that as regards those subjects which I have mentioned, you had almost to begin again when you came here?—Yes.

1168. Do you find that you get adequate instruction here?—I think it might be better.

1169. Do you mean better adapted to your needs?—Yes.

1170. On the whole, do you consider, for a young officer in your position, that the instruction generally which you obtain here is sufficient to enable you to

pass the examination?—Yes, if you work yourself, anyone, I think, could pass.

1171. Have you any private tutor?—No.

1172. Have you never had?—No.

1173. Is it the custom for sub-lieutenants to have private tutors?—I suppose about half the number do.

1174. There are about 55 here now, are there not?—I do not know the number, but I should think that about one half of them have tutors.

1175. You do not intend to have a private tutor?—No.

1176. Have you any doubt of your passing?—Not the slightest.

1177. Do you think that you will come out in the first class?—I think so.

1178. The first class, I think, requires 1,250 marks out of 1,500; you think that you will come out in the first class without having recourse to any external assistance?—Yes.

1179. How many are there generally in the first class?—They vary so much that I could not say.

1180. You think it possible for a young officer, although he may have forgotten what he learnt on board the "Britannia," to recover all that knowledge, and something more, with such assistance in the way of instruction as the college supplies?—Yes; with very few exceptions.

1181. By exceptions, do you mean of subjects or of men?—I mean of men.

1182. You think that most men might do it if they tried?—Yes; a very large proportion might.

1183. But not all?—No; I suppose there are exceptions.

1184. Should you say that one half of the men who have private tutors really require that assistance, or that they are a little negligent during the first weeks or months that they are here, and then have to make up the time again?—There is no doubt that it is to make up time that is wasted in the ordinary study hours.

1185. (*Mr. Lingen.*) You stated that the instruction might be made better; did you refer then to the subjects of instruction, or to the assistance that is given to the students in learning?—To the assistance that is given to the students.

1186. The individual assistance which you get you think might be improved?—Yes.

1187. Do you mean that there is not enough of it?—I do not think that the instructors take the interest that they might in the instruction.

1188. Is the individual instruction generally given by the professor who lectures?—No.

1189. Is it given by an assistant to the professor? There are lectures in certain subjects; and in the other subjects one instructor takes the whole class through the whole subject without giving any lectures. But with some subjects, such as physics and steam, and winds and currents, there are lectures, and you have to pick up what you can at the lectures, and you have no other instruction.

1190. Would you take some other subject in which you have individual instruction, and just describe to us the process of preparing and receiving the lesson?—We start here with algebra. There is a text book which you have to go through and get up, and you have about two months to do it in.

1191. What happens in the algebra lesson; you go into the room, and you there find the instructor;

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does he give a lecture, or does he work on the black board before you?—He illustrates the problems, that is, he illustrates the theories on the black board; but as a rule, you have to do the best part of the work yourself. In algebra, which is the first study, there is generally so much noise in the study that it is difficult to learn much.

1192. Do you use the word "study" as meaning the room in which it takes place?—Yes.

1193. Does that noise arise from the references to the instructor by the men, who are constantly going up to him for assistance?—No; it is from the noise going on in the room because proper order is not kept.

1194. Is that common in the other subjects, or do you confine it to these subjects?—No; only in the case of the algebra and the Euclid.

1195. But so far as the quantity of instruction goes, you have never yourself experienced a difficulty in getting access to the instructor when you wanted it, and in getting your questions answered?—No.

1196. I think you said that, with the exception of navigation and practical trigonometry, you had forgotten a good deal of your "Britannia" studies when you came to the college, and particularly, I think, you said that you had forgotten your algebra, and had forgotten your Euclid. Were those subjects not taught by the naval instructor in the "Trafalgar," and in the other ship which you mentioned which carried an instructor?—They were taught in the "Trafalgar," but in the "———" I do not think we ever did anything except at practical subjects, such as trigonometry and navigation.

1197. What interval had elapsed before you joined this college between your last being in a ship where there was a naval instructor?—A year and three months.

1198. During that time, from the exigencies of the service, especially on the West Coast of Africa, you could give no time whatever to study, or next to nothing?—No; very little indeed.

1199. Is it at all common in the college that those officers who are expecting to get into the first class are able to dispense with private tutors—and as a fact do they do so?—I should think nearly always. I do not know of many instances, but I should think so; of course it is only my opinion.

1200. But a private tutor is generally needed, or at any rate is employed, by officers who are unlikely to pass the examination at all, or who are less likely to pass it?—Yes.

1201. (*The Rev. H. A. Morgan.*) The private tutors are employed generally by the more idle men?—Yes.

1202. But a hard-working man who showed himself to be industrious, although not very quick, would receive sufficient instruction from the next instructor without the aid of a private tutor?—Yes, I think so.

1203. Do you find that some instructors take more pains than others with the students in their classes?—I have been with two instructors, and one I think paid a great deal more attention than the other to

the instruction; the third I do not know anything about.

1204. Do you say that the noise in the room arose from the want of discipline?—Yes.

1205. You find, do you not, that some instructors maintain far better discipline than others?—Yes.

1206. (*Mr. Lingen.*) Would it, do you think, generally be felt by the class of officers here as a serious addition to the expense of the college if an officer had to provide himself with private instruction?—Yes, I should think so.

1207. (*Chairman.*) Have you ever heard of an officer having three hours a day with a private tutor?—I never heard of such a case.

1208. (*Mr. Lingen.*) What length of time per day would your own studies occupy; the lectures appear to be going on for five hours and three quarters; is it your practice besides those five hours and three quarters to have a certain amount of private study added to that?—Yes.

1209. Does that period represent each day's work? That represents each day's work; but if you mean me personally it does not.

1210. With regard to the class of officers who more or less are of the same attainments and the same industry, and who more or less look to the same distinctions as yourself, what amount of work do they give per day; of course, that five hours and a half represents the time when you are either listening to lectures or are in the same rooms with the instructors; but I want to know whether besides that you pass any considerable amount of time in private study?—I should think from two to three hours a day besides that.

1211. That makes it extremely hard work, does it not?—I do not find it so. I have been accustomed to much more work on board ship.

1212. But not to such head-work too?—No; but then you have a night's rest every night here, which you do not get on board ship, which makes an immense difference.

1213. (*Chairman.*) Do you usually dine at mess?—Yes.

1214. (*Mr. Lingen.*) You have not found your own health suffer from that amount of head-work?—No.

1215. (*Chairman.*) Had you good health on the Coast of Africa?—As long as I was out there I had fair health.

1216. (*The Rev. H. A. Morgan.*) Did you not say that the only instruction in physics and steam which you got was that afforded by lectures?—Yes.

1217. Could not you go to the instructor and ask him to explain to you the difficulties that you might find in those subjects?—You could for an hour after each lecture. The lecturer gives us so many questions to answer, and whilst we are answering those questions we can ask him anything we like about them.

1218. But there is not the same opportunity for receiving explanations that you have in algebra and trigonometry, and so on?—No.

The witness withdrew.

Adjourned to Thursday next.

At 22, New Street, Spring Gardens, Thursday, 30th November 1876.

PRESENT :

THE REVEREND O. GORDON, B.D., IN THE CHAIR.

The REVEREND H. A. MORGAN, M.A.

R. R. W. LINGEN, Esq., C.B.

MAJOR DONNELLY, R.E.

C. D. LOVELESS, Esq., Secretary.

HENRY BEDINGFIELD GOODWIN, Esq., M.A., R.N., examined.

1219. (*Chairman.*) You are assistant to Dr. Hirst, are you not?—I am.

1220. And your time is mainly taken up with examination?—Yes. I may say entirely.

1221. Do you give no instruction whatever?—No instruction at all.

1222. Do you both set the questions and look over the answers?—As a general rule I do.

1223. Do you examine the cadets on their admission to the "Britannia"?—Yes. I make nearly the greater part of the papers in that examination.

1224. You are now referring to the examination previous to entrance on the "Britannia"?—Yes.

1225. I presume that the examination takes place twice a year?—Yes; in June and November.

1226. How many cadets are there?—That depends upon the number of nominations, which varies; but as a general rule there are between 60 and 70.

1227. How many papers do you set each of them?—About five to each, altogether.

1228. Do you also set the questions for them when they are on board the "Britannia"?—Yes; a certain portion of those papers.

1229. How many?—That depends upon the amount of time which I have to spare. The preparation of those papers is divided, as a rule, between three gentlemen; the chaplain and naval instructor of the "Duke of Wellington" generally assists us, and at present we have the assistance of a retired naval instructor, Mr. Fowler; we ask for such assistants as can be spared to us; they are not fixed at all.

1230. Do those gentlemen who set the questions also look over the answers?—Not necessarily. We divide the labour of marking the papers as circumstances render it advisable.

1231. There are about a thousand papers to look over on each examination of the cadets on board the "Britannia," are there not?—Yes; quite as many as that.

1232. How many papers are set for the final examination there?—There are eight papers altogether.

1233. That number is not so large as it used to be, is it?—I think there used to be about 14, but now there are only eight.

1234. Can you tell me in what subjects those papers are?—In the final examination in the "Britannia" there is a paper in arithmetic, algebra, and geometry,—one paper in three subjects; a paper in trigonometry, a paper in chart drawing, a paper in practical navigation, a paper in theoretical navigation, a paper in Latin, and one in English Grammar; we have not quite got rid of the English Grammar yet; and in addition to these the cadets have an essay to write on a given subject. I had forgotten to mention the papers in French and in physics; there is also an examination in drawing, although that can scarcely be called a paper.

1235. You have got rid of history and scripture history, and literature, have you not?—Yes. The literature was combined with grammar; it was not a separate paper; and we have also got rid of geography.

1236. Are there about 800 papers at each examination?—Quite as many as that. It varies with the number of the cadets, which is always fluctuating. I should think that 800 is certainly below the average.

1237. You examine also for clerkships, do you not?—Yes. I take the same part in the examination for

clerkships as for cadetships; that is, I both make the papers, and mark a certain number of them; perhaps about one half.

1238. And you examine the sub-lieutenants in their examinations?—Yes; in the sub-lieutenants' examinations there are altogether 11 ordinary papers; of those I prepare seven, and I also mark seven; besides that, I take the personal superintendence of the whole of that examination in all the subjects. I should add that when there are candidates for the Beaufort testimonial six additional papers are set, of which number I prepare two.

1239. The average number of examination papers is stated to be 110 for the sub-lieutenants' examinations, would you think that to be correct?—Yes, very nearly so; that allows 10 candidates for each examination, which is rather below than above the average.

1240. Then there are 10 examinations in the year?—Yes; making altogether about 1,100 work papers. Last year, I believe, the number exceeded 1,400.

1241. Then in the service afloat examinations, we find that there are 3,500 papers?—In that examination, of course, the number of the work papers varies very much, but there are eleven papers, and the usual number of candidates examined is between 300 and 400.

1242. Do you look over all those papers?—I look over as many as my time will permit; but, as a general rule, I do not look over the bulk of the papers in that examination.

1243. Then in the dockyards in January there are 2,000 papers sent up, are there not?—Yes.

1244. Do you look over all those?—I have on occasions looked over a large proportion of them; but, as a general rule, I do not look over more than half.

1245. Then in the dockyards in July there are 4,000 papers; what do you do with regard to those?—I make a good many of those papers, but I look over none of them. At that examination the services of three of the mathematical instructors at the college are available, because of the length of the college vacation. It is really the only break in my work in the year.

1246. Could you tell the Committee how many papers in the year you have to look over?—From a calculation which I have made I find the number marked in 1875 to be as nearly as possible 4,000; I could not, however, undertake to mark so many again.

1247. (*The Rev. H. A. Morgan.*) According to the evidence given by Dr. Hirst, I find that you and those who assist you look over about 13,000 papers?—Yes. Mr. Fowler, the retired naval instructor that I have referred to, is employed for several months in doing nothing but marking papers. Meanwhile my time is mostly taken up in preparing the examination papers.

1248. You prepare, do you not, all the papers that are set on board the "Britannia," except those that you have specified, French, and so on?—I do not myself prepare the whole of those; they are divided amongst the three examiners. We always have a staff of three examiners for the "Britannia."

1249. Do you prepare all the questions for the sub-lieutenants?—Yes; in the seven papers I mentioned I prepare the whole of them throughout the year.

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1250. Do you not find it very irksome to have to prepare 10 sets of papers in the year of the same nature?—It does become tedious. There are five consecutive monthly examinations, and then there is a break of two months; then come another five, and then another break of two months; I find that at the end of each term of five months the work becomes rather monotonous, but the interval of two months refreshes me somewhat.

1251. Do you endeavour to vary the questions as much as possible?—I do, so as to take in every part of their course in the various subjects.

1252. (*Chairman*.) And so as not to give the same questions that you have given previously?—Yes. I make it a rule never to repeat the same questions, except in the case of book-work; but I never insert the same equation twice, and so on.

1253. You look at the back papers, and take care that you do not repeat the questions, except those in the way of book-work?—Yes. I have all the former papers which have been set in a particular subject bound together, and when I make a paper in that subject, I refer to the former ones, and see that I am not repeating the questions.

1254. Then you do not find it very difficult to set 10 sets of questions in the same year to the same class of persons?—No, I think not.

1255. (*Rev. H. A. Morgan*.) Are the papers which are set to the cadets on board the "Britannia" progressive?—They are progressive so far as the different terms are concerned, certainly.

1256. (*Chairman*.) Are they easy at first, and do they gradually get more difficult?—They read a certain portion of each subject in each term, and for the most part we examine them in that particular branch of the subject in that term. They have little recapitulation except in the final term, as a rule.

1257. With regard to those papers which are sent out to the cadets on board the ship, are those progressive also?—No, not at all; each set of papers has exactly the same difficulties as those set in the previous year, otherwise we should not be able to compare the results in a satisfactory manner.

1258. Do not you expect the midshipmen on board ship to make any progress in their studies?—Yes; though in the "Britannia" subjects the papers include as much as they have already learnt in the "Britannia" and little more; with regard to the other subjects, mechanics and so on, the papers are of about the same difficulty as those set to them when they came to the college subsequently.

1259. So that what you aim at is not to see that they are taught anything fresh, but to keep them up to what they already know when they leave the "Britannia"?—In certain subjects, yes; in other subjects, no. The general paper in all mathematical subjects, known as the "Extra Paper," is very much above either the "Britannia" papers or the ordinary papers set to the sub-lieutenants at the college.

1260. Do you think that a naval cadet passing the usual qualifying examination on leaving the "Britannia" might be expected, by exercising ordinary diligence when serving afloat, and whilst at the Royal Naval College, to pass the examination for the rank of lieutenant at the proper time?—I think that a cadet who merely got through the "Britannia" with a third class certificate, and only just obtained that, if he kept the examination at the college steadily in view throughout the whole of his course, would have the very greatest difficulty in coming up to the mark. In fact, if a cadet in whom I was personally interested just got through the "Britannia" examination in the way I have mentioned, I should at once remove him from the service.

1261. Does it require greater effort on the part of an acting sub-lieutenant of inferior ability to pass the examinations for the rank of lieutenant, or for him to qualify for passing in the "Britannia"?—I think it requires a very much greater amount of energy on his part. The per-centage of marks required to pass

in the "Britannia" is, I believe, 40 per cent.; at the college it is 50 per cent., and, all things considered—that is to say, considering the preparation that they have had in each case—I should look upon the "Britannia" examination as relatively by far the easier of the two.

1262. Dr. Hirst had placed before him the examination papers that were set to the cadets on board the "Britannia" in the year 1873, and he said that there was no difference, that they were just the same as those at the college now; are you of the same opinion?—There is little difference so far as the range goes in certain subjects, such as algebra, but at the same time more difficult questions in the particular parts read are inserted into the college sheet than into the "Britannia" one.

1263. I do not think that that was Dr. Hirst's opinion?—That is my own opinion; of course it must be taken for what it is worth. One or two exceptionally hard papers found their way into the "Britannia" papers in 1873, and due allowance for their difficulty was made in marking them. I should not consider these fair specimens of the papers commonly set at that time.

1264. Are the "Britannia" papers made easier since 1873?—I think that since 1873 greater care has been taken to exclude questions likely, from their exceptional difficulty, to press hardly upon the cadets, otherwise there is not very much difference.

1265. At that time I think that the questions in some of the papers had very nearly the same value put upon them, whether they were easy or difficult?—That principle was recognized to a certain limited extent, but sometimes one question would have double the number of marks allotted to it that another question would.

1266. I think we were led to expect that the variation was very small, and that the number of marks were six for one question, and seven for another, but hardly exceeding that?—I had no directions from Dr. Woolley when I first joined him as to that practice, and in distributing the marks I followed my own ideas; so that, although I should probably have given the easier questions slightly higher marks than they might be strictly entitled to, I did not by any means reduce them all to the same level.

1267. Do you find that your work as examiner is on the whole more than you can perform effectively?—Perhaps I am not the best judge as to how far it is effectively performed, but I must say that I should be glad to have a certain amount of leisure for private reading and so on; at present I have no opportunities of that sort.

1268. Would you rather have a regular assistant or such occasional assistance as you are able to procure?—I should much rather have a second permanent examiner; he would be able to take a certain part in the monthly examination of sub-lieutenants, and the superintendence of it, which would relieve the strain very much; it would be impossible to have month after month an occasional assistant lent to us so as to afford that effective help that we want.

1269. All the questions are submitted, are they not, to Dr. Hirst?—Yes, every paper that is set in the various examinations goes to him.

1270. Does he ever make any alterations in them?—Yes, frequently.

1271. In the direction of making them more easy or more difficult?—They are mostly verbal alterations that he proposes; but sometimes he will object to a particular question, and say that he thinks it may press rather hardly upon the candidates examined, and then it is removed.

1272. Does he ever look over any of the papers?—No. In the case of those candidates who are rejected month by month he looks at their marks, and he sees in what subjects they are weak, and he sends for those work papers, and looks at the marking to see if he can possibly take a more lenient view.

1273. But generally speaking he does not look over the papers?—No, as a general rule he does not.

1274. Do you tabulate the results, or who does that?
—We have a senior clerk attached to the department for that purpose.

1275. And that, I suppose, is submitted to Dr. Hirst?
—Yes.

1276. And he makes his report?—Yes, he makes his report accordingly.

1277. (*Mr. Lingen.*) Had you been a naval instructor before you joined the college?—I had three years service at sea in that capacity.

1278. Did you pass an examination yourself in those days before you became an instructor?—Yes, a very similar examination to that which is in force now.

1279. Was the system of setting the papers then the same; that is to say, were they official examiners who set the papers and who looked over them as now?—At that time Professor Main and Mr. Tompkins, a naval instructor attached to the college, together with Mr. Laughton, another naval instructor attached to the college, conducted the examinations, and during the time that these lasted the services of those officers were withdrawn from their ordinary work.

1280. But the systems then in force and now in force were to this extent the same, that the gentlemen who examined were also naval authorities?—Yes, it was exactly the same in that respect.

1281. You have not had any experience of your own in examinations,—I mean as having passed examinations yourself that were set by wholly independent persons, who had nothing to do with the previous studies, either in prescribing them or in giving them?—No, I have not.

1282. Should you be in favour of a test examination for admission into the college?—There are so many classes of officers studying at the college that I hardly know to what class you refer.

1283. I confine my questions to acting sub-lieutenants?—I think that it would hardly be practicable. The acting sub-lieutenants who come to the college have been serving under such very different conditions that it would be very unfair to apply the same test to all.

1284. What would be the principal variety of conditions that would strike you in the service of acting sub-lieutenants?—In some cases an officer after leaving the "Britannia" is sent to a ship on the east or west coast of Africa, a gunboat or other small ship, and he may literally never see a naval instructor from the time that he leaves the "Britannia" till he appears at the college. In another case an officer may be sent to the channel squadron or the flying squadron, where the greatest care is taken that the instruction of the young officers may be regular, and that they read so many hours a week.

1285. And as the result of that, have the officers who have been under a naval instructor, or have not been under a naval instructor, during their sea service, been found practically to be very different in their attainments when they join the college?—I am hardly in a position to say that; I have never seen any tabular statement giving the number of officers who have served with naval instructors and those who have not done so.

1286. (*The Rev. H. A. Morgan.*) Judging by the answers which you receive to your examination papers, are you of opinion, on the whole, that the sub-lieutenants have received an adequate amount of instruction in the college, and have been well trained?—I think so decidedly.

1287. And that you cannot find evidence of cram in the papers which you look over?—No, I think not.

1288. Not of the sort of cram that has generally been instilled into their pupils by private tutors?—No, I think I see very little indication of such cram.

1289. Do you think that many of the sub-lieutenants have private tutors?—I have known a good many cases in which they have, but mostly in the case of the weaker officers. As a general rule, those who are in a

position to take first class and second class certificates do not think of going to a private tutor.

1290. Can you discover generally by the answers who amongst the sub-lieutenants have had private tutors?—No, I cannot say that I can.

1291. Do you think that many of those who have private tutors distinguish themselves in the examinations ultimately; for instance, do they obtain first class certificates?—No; I should say that those who are in a position to expect first or second class certificates, as a general rule, would find the instruction at the College quite sufficient for them.

1292. And they would not have private tutors?—I think not.

1293. Do you think there are amongst those sub-lieutenants a considerable number who would be capable of undertaking a higher course of study with advantage to themselves, than that which they receive at the present time in the college?—I think not. At present the term of six months that they spend at the college enables them to be thoroughly grounded in those subjects which they take up, and I think they are fairly well proficient in those subjects; but if the course were extended, I think we should see something in the direction of thoroughness.

1294. But there must be amongst them a considerable number who remember fairly well what they learned in the "Britannia," especially those who have been in the larger ships, where they have had proper instruction from the naval instructors?—Yes, but that only refers to particular subjects. There are certain subjects which are included in the course at the college with which they have nothing whatever to do in the "Britannia," such as steam, mechanics, hydrostatics, and nautical meteorology. Such subjects as these are almost or wholly new to a large proportion of the officers on joining the college.

1295. Do they generally devote a certain part of their time to such subjects as steam, navigation, and so on?—I do not think that the college course admits of it. When they first go to the college they pass a certain time—two months, I think it is—with a naval instructor, who teaches them algebra and geometry, beginning at the very beginning, and going right through the subject. Then they go to a second naval instructor, who takes them on in trigonometry, mechanics, hydrostatics, and so on, till in course of time they reach the third naval instructor, when they commence their course in navigation.

1296. Some of those sub-lieutenants know very little indeed, we hear, when they come to the college, whereas others know a considerable amount. In the case of those who know a fair amount, and who remember their algebra and trigonometry well, might they not with advantage to themselves be placed in a higher class and undergo a higher order of instruction than what they now undergo? For instance, might they not with advantage to themselves attend the classes superintended by Professor Lambert himself?—They would not be able to follow that course up. They have but six months at the college, and are then obliged to go to sea again. There is no provision for the study of sub-lieutenants at the college, except for this compulsory course, so that they would make a beginning and nothing more. They would have to go to sea, and their time would to a certain extent be wasted.

1297. Is there no officer on board small ships who might instruct those midshipmen when they are at sea?—There is a regulation that in the absence of a naval instructor any executive officer approved by the captain may discharge the naval instructor's duty, and in that case he receives a certain very trifling allowance, but such instructors as those very seldom attempt to do more than to push the midshipmen on a little with their practical navigation. They scarcely interfere in any other subjects at all.

1298. Practically the midshipmen do very little Euclid, or trigonometry, or algebra, when they are in the small ships?—I think I may say none at all, unless in very exceptional cases.

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1299. If they could keep up that course of study which they went through in the "Britannia," the result would be very different, would it not, in the final examination at the college?—If that were the case, we might expect that a very few of those officers who have spent the greater part of their time in the channel and flying squadrons would fail to pass ultimately at the college, but I know that the number of cases is considerable in which such officers as have had those advantages have nevertheless failed to pass, so that I should hardly be justified in saying that I think the result would be very different.

1300. Is there strict discipline kept up in their classes by the naval instructors in the large ships—are the midshipmen compelled to work?—It is very difficult to exercise anything like compulsion. The fact is that very often, even in the largest and most commodious ships, the study is conducted under difficulties, which render any real progress almost impossible.

1301. Can you give us any idea how many hours a midshipman is compelled to attend the classes in a flag ship when he is under a naval instructor?—The number of hours of work is generally regulated in the several fleets by order of the admiral commanding. In the flying squadron in 1871 and 1872 the order was that there should be ten hours a week, but those hours of study were liable to be broken in upon by certain interruptions, and any deficiency in one week was not allowed to be made up by an excess in the next week. Thus a ship which averaged seven and a half hours a week would be doing very well indeed, and that I think might be taken as a very fair example of the usual amount of study in the whole fleet.

1302. Are you now referring to large ships?—To ships carrying naval instructors; in the flying and channel squadrons every ship carried a naval instructor, and a large proportion of the whole of the midshipmen in the service are serving in those two squadrons.

1303. (*Chairman.*) The authorities of the college discourage private tuition, do they not?—I have heard so, but I cannot say positively.

1304. Are you aware to what extent private tuition is resorted to?—As I say, I think it is only in the case of those sub-lieutenants who almost despair of passing, or at all events who anticipate great difficulty in passing, that there is any resort to private tutors at all.

1305. Then you are not aware that about one half the number are obliged to, or, at all events, do resort to private tuition?—Of the sub-lieutenants examined in 1875 not more than 50 obtained 900 marks and upwards. Most of those below this standard would be in the position of uncertainty as to their chance of passing, to which I have alluded.

1306. Have you ever heard of the case of a young man having three hours a day with a private tutor?—No, I never heard of such a case.

1307. Do you know how much private tutors charge an hour?—I have no idea.

1308. And you do not know who the private tutors are?—I happen to know that Mr. Fowler, the naval instructor to whom I referred previously, takes occasionally one or two sub-lieutenants.

1309. And that is the gentleman, is it not, who assists in the examinations?—In certain examinations; he has never been in any way connected with the sub-lieutenants' examinations.

1310. And he takes private pupils?—He has done so. I am not aware whether he does now; I believe not.

1311. (*Mr. Lingen.*) There would be nothing, would there, to prevent his having them?—No, I think not.

1312. (*Chairman.*) I presume it may be said that if so many as half of the acting sub-lieutenants have recourse to private tuition, they feel some need of it?—They are used to what we may call personal individual instruction, and they are not accustomed to be

instructed in a class, and possibly that may be the reason.

1313. You do not think that the circumstance that they find it necessary to have resort to private tuition is any proof that the instructors are not efficient or careful?—Not at all. I think that under any system some would continue to resort to private tuition.

1314. But not one half of the whole, you think?—I think that one half would, from what I know of them, that is, unless they can have as much individual attention from the naval instructor as they now obtain from their private tutor.

1315. But they get individual instruction in the classes do they not?—To a certain extent.

1316. But not so far as they find necessary?—I presume so.

1317. You do not think then, that any fault can be found with the naval instructors, either as regards their efficiency or their number?—I think that the sub-lieutenants at the college are exceptionally fortunate with regard to the means of receiving instruction which they enjoy.

1318. Do you ever go into their studies when they are at work?—No, I never do.

1319. (*Mr. Lingen.*) Does Dr. Hirst do so?—I believe Dr. Hirst does.

1320. (*Major Donnelly.*) When an acting sub-lieutenant joins, he and those who join at the same time with him, go on in one class, do they not, during the whole of the six months, in all their studies, in their mathematics and mechanics, and so on?—Yes, in everything, I may say, except in those branches in which the whole body receive lectures collectively.

1321. That is to say, there is no separation between those who get on faster and those who are not equal to keep pace with them?—No, none at all.

1322. (*Chairman.*) So that if one acting sub-lieutenant came up who could not do a simple equation, at the same time as another who was perfectly familiar with quadratic equations, they would be taught together?—Yes, they would form one "division," as I think the term is.

1323. And the instructor, I suppose, would endeavour to adapt his instructions as well as he could to both of them, or would he take a kind of average, and teach, as it were, an average man?—That, I imagine, is left very much to his own judgment, and the practice of course would vary in different cases, according to the views of the instructor.

1324. You were assistant to the Director of Education, Dr. Woolley, were you not, before the establishment of the Royal Naval College?—Yes.

1325. How many years were you with him?—I was with him for two years; that is to say, in the same office.

1326. This is your third year at the college, is it not?—I am just beginning my third year.

1327. (*Major Donnelly.*) You say that the sub-lieutenants who pass are required to attain 50 per cent. of the marks on the papers?—50 per cent. of the total, not in each subject.

1328. Is there any minimum for mathematics?—No, there is no minimum at all; there are no restrictions except with regard to obtaining a second or a first class certificate. No sub-lieutenant can obtain a second or first class certificate unless he obtains a certain proportion (which I do not remember at this moment) of marks in each of the mathematical subjects; it is one fifth, or something like that, I think.

1329. Then a student by doing very well in some of the subjects may manage to scrape through, although he does really very badly in mathematics?—That may occasionally happen.

1330. (*The Rev. H. A. Morgan.*) Have you ever heard that proper discipline is not maintained in the studies or lecture rooms which are frequented by the sub-lieutenants?—No, I never heard that.

1331. Have you never heard that there was so much noise in one of those lecture rooms that the sub-lieutenants who were desirous of working could not do so properly?—No, I have never heard of any

unusual amount of noise. Of course, where a good many officers are studying together, there must be a certain amount of noise.

1332. I mean noise owing to the want of proper discipline?—No, I never heard of it.

1333. (*Mr. Lingen.*) Who selects the assistants when you require assistance for the examinations?—Dr. Hirst recommends that certain assistants should be appointed for particular examinations.

1334. And then they are appointed, are they not, by the Admiralty?—Yes.

1335. Practically his recommendations are always taken, are they not?—I do not remember any case in which they have been disregarded.

1336. Has Mr. Fowler any connection with the college, except being occasionally employed as an examiner?—No, no connection whatever.

1337. His residence in the neighbourhood of the college is his own personal affair, is it not?—It is.

1338. (*Chairman.*) Do you examine the Latin papers?—I examine the Latin papers in the "Britannia."

1339. Do you find that they know much Latin?—I find as a general rule that they know little or none. Of course there are certain exceptions to that rule.

1340. Do you give them English to translate into Latin?—They send in certain portions of the books that they have been reading during the term, and a certain number of passages are set in those to test their proficiency in the subjects read, and an easy passage is set from some other author that they have previously not seen, and for that they are allowed to have the aid of a dictionary. Besides this a few easy English sentences are proposed for translation into Latin; these are for the most part framed upon the model of those comprised in the exercises upon which they have been engaged during the term.

1341. (*Mr. Lingen.*) You assist Dr. Hirst chiefly in the duties of examination, but so far as the direction of studies goes, that, I presume, is in his own hands?—Entirely.

1342. (*Major Donnelly.*) Have you ever been to the Dockyard schools to inspect them for Dr. Hirst?—No, I have never taken that duty.

1343. Does Dr. Hirst do that all himself or has he any assistance?—Dr. Hirst does it himself.

1344. Do you set any of the papers for those schools?—I set some of them.

1345. Do you look over them?—I look over them when my time permits.

1346. (*Chairman.*) Could you state the number of papers which you look over in the year, and the examinations to which those papers belong?—I have prepared a detailed analysis of the different examinations conducted in 1875 under Dr. Hirst's superintendence, the accuracy of which may, I believe, be relied upon. Upon the whole, according to these calculations, 269 papers were issued during the year in connection with the various examinations, of which number I prepared, myself, 176; during the same period 11,500 work papers were examined, of which 4,000 fell to my share. In addition to these duties, I was employed for 60 days in personally superintending the examination for the rank of lieutenant, for 22 days upon the same duty on board the "Britannia," and for about 20 days in connection with other examinations, making a total of 102 days upon which my time was wholly or partially taken up by duties of this character. I may add that except the monthly examination for rank of lieutenant and the examination of voluntary students in navigation and meteorology, the work upon which I am engaged is unconnected with the Royal Naval College.

STATEMENT OF EXAMINATION PAPERS FOR RANK OF LIEUTENANT, &c. and EXTERNAL EXAMINATIONS IN 1875.

Examination.	Total number of Examination Papers set.	Number prepared by Mr. Goodwin.	Total number of Work Papers marked.	Number marked by Mr. Goodwin.
For rank of Lieutenant, R.N.	134	78	1,420	900
Voluntary and other Students at R.N. College at end of session (in Navigation, Nautical Astronomy, and Meteorology)	4	4	160	160
Junior Officers afloat:				
July	11	10	1,500	Nil.
December	11	7	NIL	—
Cadets in H.M.S. "Britannia":				
July	32	26	1,040	800
December	31	20	1,300	320
Naval Cadetships:				
June	5	3	315	180
November	5	3	330	135
Assistant Clerkships, R.N.:				
May	6	4	100	50
November	9	6	130	60
Naval instructors	5	4	5	10
Engineer Students and Dockyard Apprentices at Dockyard Schools:				
January	6	4	2,200	1,200
July	10	7	3,000	180
Total	269	176	11,500	4,065

H. B. GOODWIN,
For Director of Studies.

The witness withdrew.

Captain CHARLES THOMAS CURME, R.N., examined.

1347. (*Chairman.*) You have lately been one of the voluntary students at the Royal Naval College, have you not?—Yes.

1348. When did you leave it?—I left on the 30th of June 1874.

1349. Were you there one session?—I was there nearly a session; I was a fortnight late in entering. I had only just come home from the Pacific.

1350. Under whose instruction were you?—Professor Lambert was head of the room that I was in, with Mr. Henry as assistant.

1351. Did you pass an examination previously to your going in?—No. Dr. Hirst simply had a talk with me just to ascertain what I was likely to do, and what I proposed to do.

1352. I think with voluntary students, as you were, there is no course prescribed except a mathematical course, is there?—None.

1353. Were you a good mathematician when you went in?—I had kept it up fairly. I could not venture to call myself a good mathematician.

1354. I suppose you were never on board the "Britannia"?—No, I had been at the old naval college, also as a voluntary student.

1355. Did you pursue the study of mathematics very closely when you were at Greenwich?—Yes,

I worked very hard. I worked 10 hours a day for the last two months of the term.

1356. What other subjects did you devote your time to?—I used to attend lectures on chemistry, physics, French, and nautical surveying. The only other lectures were those on international law which were public lectures by Professor Bernard.

1357. How far did you carry your mathematical studies when you were there?—Everything short of the differential and integral calculus. I did a little of the integral. Although I had been tolerably well grounded, as I thought, in the old system, of differentiation by series, I found that I was so completely behind-hand with the new system of teaching it that I dropped it. Todhunter was the class-book which I reluctantly found I could not get over.

1358. (*The Rev. H. A. Morgan.*) Had you worked it up in Hall?—Yes, in Hall.

1359. (*Chairman.*) Did you find every assistance in the prosecution of your studies at the college?—Yes, there was everything that I could wish for in that way.

1360. You found Professor Lambert a most efficient teacher?—Yes, excellent, and his second, Mr. Henry, was, if possible better for men who were not

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far advanced. I think he appreciated their difficulties more.

1361. And you got every individual assistance that you wanted?—Yes, nothing could be better.

1362. How many were there generally in your class?—I think we were about 25 in the room, and we were practically in two divisions, that is to say, those who were going on with the differential and integral, and those who were not. In fact, some did nothing except analytical trigonometry and a little mechanics.

1363. And you found that you had all the assistance that you wanted?—Yes, from Professor Lambert, the head of the room, and his second, Mr. Henry. Dr. Hirst was also frequently in and out.

1364. Did you find that on the whole you got great advantage from your session of study there?—Yes, I think it did me a great deal of good. I was, however, very much disappointed at the result of the examination. I took a much lower place than I expected, or than I had taken in the intermediate examinations. I was too old.

1365. Then a great part of that time must have been passed in your own room studying there?—Yes.

1366. Had you any assistance there; did any professor ever look in upon you?—No, I was at home; being a married man I lived outside, and all my extra work was done at home entirely by myself.

1367. Do any of the voluntary students there obtain extraneous assistance in the way of private tuition?—I do not think any did at that time. I never heard of it. Certainly none of the men of about my own standing did. Of course I am speaking of my own room merely.

1368. In fact, you never felt that you wanted it?—No; I used to bring my papers in the morning, and say what my difficulties had been, and get them solved. I wanted no outside assistance.

1369. You were rather disappointed at the result of the final examination. Do you know in what particular subjects you did not come up to your own expectations?—Yes, I broke down in conic sections.

1370. Were you working analytically or geometrically?—Analytically. The parabola we did geometrically as well.

1371. Was that a new subject to you entirely when you went to the college?—No, it was treated in a new way, but it was not a new subject.

1372. (*Mr. Lingen.*) Were you acquainted at all with the acting sub-lieutenants as a class in the college?—No. We were in different rooms, and I had quite enough of my own work to do. I occasionally used to go into their room to see what was going on, but I was not mixed up with them in any way. I could not tell you anything that would be worth your hearing about what they did, because I do not know of my own knowledge.

1373. You had no opportunity to form any opinion as to the influence that their studies would be likely to have upon their efficiency as officers afloat afterwards?—I had a pretty good general idea of what they were doing, and I could give you a pretty decided opinion about the whole subject if you like to have it.

1374. The class of officers who are now passing through the college having amongst them those who will be the future officers of the navy, and you yourself being an officer experienced in command, I think the Committee would be exceedingly glad to hear your opinion of the influence of the college upon the lieutenants?—I think the scheme was an excellent one for anybody with a taste and capacity for mathematics. Of course in the case of some men nothing would hammer that into them; they have no taste for it and no capacity, and I think there were too many subjects for them.

1375. Would your experience be that an officer who had an absolute incapacity for mathematics would be also incapacitated for the duties of a naval officer of the future?—Certainly not. My idea is this, that it should be a *sine qua non* that a man should not receive a commission as lieutenant until he could work what we used to call the college sheet readily and

correctly, was a good observer, and knew something of trigonometry. I do not mean analytically, but enough to work any problem in surveying. If he does that, and knows something of popular astronomy, steam, and winds and currents, that is quite enough, I think, and he might do that in three months.

1376. Does he possess that knowledge when he quits the "Britannia" as a rule?—I fancy so to a certain extent.

1377. Have you had officers under your own command who have come direct to you from the "Britannia"?—Yes.

1378. Did you find that they possessed that amount of mathematical knowledge?—I have been very fortunate. In the last ship which I commanded two of the youngsters have won their commissions. There were two or three out of eight or nine that were very good. One or two simply knew next to nothing either from incapacity or from idleness, I do not know which. I think that any decently educated boy ought to be able to work the college sheet.

1379. Did the ships of which you were in command carry naval instructors?—Yes. I was in the "Euphrates" Indian troopship for three years where we had no subordinate officers except navigating ones, but in the "Repulse" I had a large number; but I was only 15 months in command, so that it cannot be said that I have had very much experience in the matter, but as second in command I have seen a great deal of those officers.

1380. Should you say that it makes a great deal of difference in an officer's advantages, whether he serves in a ship with or without a naval instructor?—I have no doubt whatever that you could not do without naval instructors, but I think that I should attempt very little beyond the college sheet, practical steam, and surveying. I do not believe in teaching mathematics at the age of boys as midshipmen, certainly nothing approaching high mathematics. I do not believe it is possible to teach them to boys between 13 and 18 or 19. I do not think that their reasoning powers are sufficiently developed; I have no faith in it at all. I consider it is a loss of time. Of course there are exceptional cases, but I believe that to be the rule.

1381. Take the cases of an officer who had no turn whatever for mathematics, but who passed out of the Britannia, we will say with a third-class, and was his six years at sea; do you think that on the whole it would be any advantage to him with regard to his future efficiency to go to the Royal Naval College at Greenwich?—That depends upon whether you mean as qualifying him for a certain examination, or that he should attempt to learn mathematics.

1382. The gist of my question bore upon this point: whether a cadet passing out of the "Britannia" in the third class, and obviously with no mathematical turn, would be carried by the course at the Greenwich College into studies, and into attainments that would be of practical use to him afterwards, or whether you think that he would have reached the utmost in the way of study and of attainments at the time of his quitting the "Britannia" and with the experience of service afterwards?—I presume that they would give him some time at Greenwich to rub up. There are so many other subjects that he may possibly have a taste for, such as for languages, or for drawing, if you allow those things to be included, then I would say, by all means let him continue them; but I do not think you could get any more mathematics into him, or at least any more that would be useful.

1383. Your view would be that if he came to the college he should be rather there as a volunteer than as a compulsory student?—Yes, I think I can put it into a few words in this way. They should have three months at the college first of all and the examination at the end of that time should be confined to what I call the college sheet, and if you please you may add winds, currents, practical steam, and surveying; this he should pass at the end of three months residence in college.

1384. Would you kindly state what exactly you understand by "the college sheet"?—It includes first of all finding a ship's position by what is called the dead reckoning, as well as questions in trigonometry, that is, measurement of heights and distances, observation of the sun, moon, and stars for latitude and for longitude, the variation and deviation of the compass, and questions on tides. If a man can work the college sheet readily and correctly he certainly ought to be able to take a ship about all over the world, although he may not know the reason of what he is doing.

1385. During the three months in which he was at college, would you contemplate that he should learn the reason of what he was doing?—No, not in the first three months; I should rub him up in what he had been able to do at sea, and in taking observations on shore, and as I said perhaps winds and currents, steam, and surveying, nothing more.

1386. Take the case of an officer with a somewhat greater aptitude for mathematics, an average student, quitting the "Britannia," neither very bad nor very good, should you think that the course which is prescribed at the college would make him a better officer?—Undoubtedly; no doubt at all about it.

1387. Have you had under your own command any officers who have passed through the college as acting sub-lieutenants?—No, not in Greenwich; those I had with me had been through the old college at Portsmouth.

1388. What was the official relation between Professor Lambert and Mr. Henry; did Mr. Henry work entirely in assisting the members of Mr. Lambert's class in preparing for Mr. Lambert's lectures?—Yes, I looked upon him always as Professor Lambert's assistant, and a very excellent one he was; but he was I believe only subordinate and assistant, he had no independent line of his own.

1389. He was entirely under Professor Lambert's direction?—Entirely.

1390. And with the view of bringing the class up to a standard that would enable them to profit by Professor Lambert's lectures?—Just so. When I speak of some officers stopping only for three months, I hope you will not think for one moment that I do not value the whole course; I am simply speaking of those who have no taste or capacity for mathematics.

1391. (*The Rev. H. A. Morgan.*) Have you had a large number of cadets who have passed out of the "Britannia" course under your command at sea?—No, I was in the "Euphrates" troopship three years, where we had none, but in the "Repulse" we had ten or twelve, I think.

1392. Had you some who passed with a first class certificate and others with a third class?—Yes.

1393. Did you find that those who passed with a first-class certificate were smarter officers generally than those who passed with a lower certificate?—I can hardly generalize from so small a number, but it did so happen that the two boys who passed well in mathematics, Lake and Burney, have turned out admirably since, and it so happened that they were the best and most useful in every way.

1394. What opportunities had those boys of keeping up their mathematical studies on board the "Repulse"?—They had a very good naval instructor, and I allowed nothing to interfere with their school from about half-past nine until half-past eleven in the morning, and from half-past one to half-past three in the afternoon. Perhaps not always in the afternoon, because there were gunnery and other things to be attended to, but on an average they had about three hours a day of good instruction.

1395. Or about 18 hours a week?—Not that perhaps, say 15 hours a week.

1396. Do you suppose that those young officers kept up the amount of education that they acquired in the "Britannia" when they were with you in the "Repulse"?—Those above the average certainly did.

1397. They did not forget it?—No. There is a very wide difference between them. Those who did

well in the "Britannia" did well with the naval instructor; and there is the proof inasmuch as they came home and got a first-class certificate at the college. In fact, both of them got their commissions as lieutenants. Of course it is a small number to generalize from.

1398. The amount of mathematics on board the "Britannia" would include in algebra as far as geometrical and arithmetical progression, in trigonometry, the solution of triangles, and so on; do you approve generally of young cadets in the "Britannia" studying such subjects as those at the age of 14 and 15?—I think they go a little too far. It would be better if they did not try after so high a standard.

1399. I thought you stated that at first you would be satisfied with their knowing the college-sheet only, but I suppose in addition to that you would approve of their reading geometry, algebra, and elementary trigonometry?—Yes.

1400. Every officer who went into the navy ought, you think, to have a thoroughly good grounding in elementary mathematics?—Yes, undoubtedly, because it gives him such an immense advantage afterwards.

1401. Do you approve of sub-lieutenants at Greenwich reading such subjects as elementary statics and hydrostatics?—No, I think it is thrown away in the case of many of them. I have a strong opinion upon that point. I do not ask for any more than the three months for perfecting them and making them ready to work the college sheet and one or two more subjects, doing it in a thoroughly practical way. At the end of that time if they were fit for it I would require that they should go on. Then I would give them three months of a more extended course, and if they had done that well then I would let the best of them go through the whole of a nine months course, in fact the full course at Greenwich.

1402. Those of very moderate capacity you would not compel to work up such propositions as the parallelogram of forces?—No, I think not.

1403. You think that they will make sufficiently good officers for the service for such positions as they might attain afterwards without such knowledge?—Yes; as a man may have other very valuable qualities for a naval career without being a mathematician.

1404. You would have no objection to have such a man in your ship as a lieutenant?—No. A man may be a very good gunnery officer, or he may be a good linguist or a good surveyor. There may be many acquirements which even without a theoretical knowledge of them are very useful to officers.

1405. (*Major Donnelly.*) Would you suggest that those officers who show no particular capacity for mathematics should take up some other subjects?—Yes; after three months.

1406. After they had got sufficient knowledge to work the college sheet as a *sine quâ non*, as I understand you, you would not recommend those who had no capacity for mathematics continuing to grind at them; but you would advise that they should take up some other branches of study?—Yes; and I would hold out every encouragement to them. I should try to find out anything whatever in which they might succeed. I would rather see a man take up any one subject thoroughly, say languages or chemistry, or experimental physics, or any one thing, but I would insist that he should work.

1407. But you would not turn the whole instruction so completely upon mathematics?—No; I think in many cases the time and labour are utterly thrown away. I am not speaking of the idle ones, but I am speaking of those who really wish to do something, but who have no taste or capacity for mathematics.

1408. (*The Rev. H. A. Morgan.*) At the same time you consider it desirable that the navy should have a certain number of first rate mathematicians amongst its officers?—Undoubtedly. I could not put too high a value upon them.

1409. Especially in consequence of the difficult problems which must naturally arise in gunnery and in the construction of ships?—Yes; for of course a

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man can pursue no independent investigation without a thorough knowledge of mathematics.

1410. So that it is desirable that the college should educate a number of very highly trained mathematical men?—Undoubtedly. You can hardly go too far in that direction.

1411. (*Chairman.*) Amongst the subjects that were originally contemplated when this college was founded were geology, botany, and natural history. Those seem to have dropped out of the course altogether?—Yes.

1412. If a young man could work the college sheet satisfactorily, you would allow him to devote his time to some such subject as that?—I would.

1413. Do you think that the country have lost the services of any useful officers in consequence of their not being able to pass this examination of which the programme is before us?—It is two years since I was there, and I do not know exactly what they have been doing lately. I venture to say without any hesitation that five sixths of those that break down, break down from pure laziness or worse. Of course this programme includes everything. If you will allow me I will take this one case of physics. It is absurd that supposing one of these officers had been up in the Arctic regions, and had been asked to give an evening lecture on the barometer or the thermometer, he should not be able to do so; but there is not one out of the five or six rejected ones that could give the least idea of what it was like or what the principles were.

1414. (*Mr. Lingen.*) Was that included in the college sheet?—No, not in the old one, certainly not. Of course any half-a-dozen men will differ in opinion as to what are the real essentials, but large as this list is there are a great many things in it which I should say are absolutely necessary.

1415. (*Chairman.*) Do you know that there is a considerable amount of private tuition there?—I do. That is one thing I was going to mention. No doubt at the time I was there the quality of the teaching was admirable, but the staff was not large enough, and the consequence was that the sub-lieutenants were driven outside. Of course some young men always will do that, but there were not enough to look after them, the number of instructors was so small.

1416. We were told that the number of sub-lieutenants during the last year has been larger than it is likely to be again; it has been up to 102 at one time, I think we were told, and it was the opinion of Admiral Fanshawe, that the staff was sufficient for the instruction of 75, are you of that opinion?—It has been increased since I was there. I think there has been an addition of two for the sub-lieutenants since I was there.

1417. Supposing that one-half of them had recourse to private tuition would not that rather point to the conclusion that the want is generally felt of some further assistance?—I am not speaking now of what I saw, but I know it is a very common complaint amongst them that they are obliged to go outside for assistance.

1418. Did you ever hear of an acting sub-lieutenant having a private tutor three hours a day?—No, I do not remember it. I do know as a fact that they were working with private tutors outside. No one has ever told me what he has done, and I do not know.

1419. Do you know who the private tutors are generally. Do you know any of them?—I do not personally know any of them.

1420. Do you know Mr. Fowler?—I do not.

1421. He is a gentleman who assists in the examinations?—It is more than two years since I was there, and I have no doubt as time has gone on that some of those men have found their way down there.

1422. You say that you had an excellent naval instructor on board your vessel?—Yes, on board the "Repulse."

1423. Do you think that the naval instructors are generally efficient men?—Yes, certainly, all that I have known. The one that I know best was three

years and ten months in the ship with me, he is now at Greenwich, Mr. Laughton, and he is a first-rate man.

1424. It seems that the naval instructors, before they are appointed, go through a course of instruction, not exceeding nine months, in the college, and they pass an examination; I suppose that that examination insures their having sufficient knowledge, but it does not follow therefore that they may be good instructors?—No, it proves nothing about their teaching power; here are no means of testing that, so far as I know, at Greenwich.

1425. (*The Rev. H. A. Morgan.*) Have you ever heard that proper discipline was not maintained in some of the class rooms at Greenwich, but that there was such noise that those young sub-lieutenants who were quiet were not able to study properly?—Certainly, I have gone into the rooms, and seen some youngsters with their heads down, but I never was witness to nor did I ever hear of a row.

1426. Was that in the morning, or in the evening?—In the morning, and after luncheon; it was certainly more evident in the afternoon than in the morning, that their heads were not clear.

1427. (*Chairman.*) I think it happened lately that about seven out of twelve were rejected in the examination; did you ever hear of that?—Yes, I saw it in the papers.

1428. And it was mentioned in Parliament, was it not?—Yes, I saw it, and I have not a doubt in my own mind that five-sixths of those who were rejected were rejected because they would not work, and did not work, or they might at least have got a third class in five cases out of the six. That of course is my opinion, but I believe that many of them were thoroughly idle fellows.

1429. (*The Rev. H. A. Morgan.*) Would not those fellows be found out in the six years that they were in a ship; would not their idleness have shown itself there?—I have no doubt that it would; but you must remember that there are such facilities at Greenwich for getting to London.

1430. (*Chairman.*) Is it not the case that the acting sub-lieutenants are kept under more strict discipline than the other students of the college?—There is a difference between them; I forget at the moment what the rule is, but I think that they have leave until 11 o'clock, but they have lots of time to run up to town and back again. I know that Sir Cooper Key was straining after a very high standard, in his treatment of them, and he had an idea that the more they were trusted and the more liberty that was given to them the better. He knew a great deal more of what was going on than the youngsters gave him credit for, and if he had gone to the other extreme and tied them up, the very people that are now complaining of license would be the very first that would say, why do not you treat them like gentlemen and trust them! If they have not self-denial enough to work without pressure being brought to bear on them they will do no good in the service; after all the hours are short, from nine to one in the morning and from two to four in the afternoon. I believe that if any man of decent average ability, even without any special capacity for mathematics, would keep his head clear and work those six hours he would get a third class with facility.

1431-1432. Do you think that we are justified in saying that as regards the voluntary students there is nothing to be desired in the way of instruction?—Just so. I should go there again with great pleasure, and I should ask for no alteration of any kind.

1433. (*The Rev. H. A. Morgan.*) The remarks that you have made as regards idleness, and so on, would not apply, would they, to the engineers and such young men?—No, I think not.

1434. Did not Professor Lambert's upper class work well?—Yes.

1435. Then those under Professor Lambert really worked hard?—There was hardly an exception in my room; out of 26 or 27 there were only about three

idle ones ; certainly not more. All those who were in training for gunnery lieutenants worked very hard indeed.

1436. (*Chairman.*) Did the idle ones stay the full time or did they get tired?—I think one gentleman was requested to retire if I remember rightly. I am not sure that there were not more.

1437. You would naturally expect a few cases of that sort?—Yes, but of course it is a very silly thing for a man voluntarily to go there professedly to study and then to play the fool.

1438. (*Mr. Lingen.*) Do you think that there would be any advantage in having an entrance examination for the sub-lieutenants in order to determine whether or not it was desirable for them to enter the college at all, or would you be content with their three months previously, that they all should come compulsorily for three months and then decide whether they should go on or not, or do you think that it would be more desirable to have an examination absolutely at the entrance to decide whether they should come to the college at all?—I think it is a good plan to examine them upon entry, but I think practically it would be better to give a three month's trial to everybody. There is no reason why you should not have an entrance examination as well. I should think it would help the professors in deciding what a man was likely to do, but I think I should insist upon everybody being three months on trial.

1439. Then I clearly understand this to be your opinion, that if an officer had thoroughly mastered the contents of the college sheet he would be able to perform every duty on shipboard that he would practically be called upon to undertake, and that the difference between an officer who had mastered the sheet and one who had gone through the complete college course would not be in respect of any particular acts that he might have to do on board ship which one would be capable of doing and the other not, but that he would be generally a more intelligent and superior officer?—I think a man might be a very good trustworthy and useful officer of the watch who is not able to do anything more than work the college sheet and observe.

1440. Would he be fit to command a ship?—Yes, and he might have other high qualities that are necessary for a naval officer in an unusual degree.

1441–1442. You would extend that to the navigation of the ship, and not merely to their fighting capacities?—Yes. I should insist that he should be thoroughly capable of taking a ship about the world ; that is, that he should be a thoroughly good practical navigator. I know that the word “practical” is very often misused, but I mean that he should be able to take and work out observations and keep the ship's reckoning, and I think that every officer ought to be able to make a reliable survey of a port. He should also have a practical knowledge of steam.

1443. And speaking of qualities generally beyond the college sheet you would say that the naval college was an educational rather than a strictly professional institution that made better officers generally, but that was not necessary for the actual duties which individual officers would have to perform?—I do not know that I should go quite so far as that. I can only repeat what I have said, that a man might take a ship about the world or command one, knowing no more than I have said, but he would be a very much better officer in every way, and he would be independent of those under him if he had gone through the college course.

1444. (*The Rev H. A. Morgan.*) And a thorough knowledge of steam would be a great advantage to a captain, would it not, with such a large number of men employed in connexion with the engines?—Yes, a man may be perfectly at the mercy of his chief engineer. The chief engineer may say that the ship cannot do so-and-so, and the captain may have no means of judging for himself whether his statement is correct or not; and not only so, but in my own opinion, the economising of fuel and making quick

passages, quite as much depends upon the captain as upon the chief engineer.

1445. We have been told that in the case of those sub-lieutenants their idleness generally occurs in the first few months they are at the college, and that after that they begin to work ; does that arise, do you think, from the fact of the examination being so far off, or from the fact of their having been kept under very severe discipline when at sea, and on their coming to Greenwich, suddenly finding themselves their own masters, and therefore taking a certain amount of licence?—I think it is extremely likely that such is the fact. Many of them have come there straight from ships on foreign stations, and it is a complete change of life to them altogether, moreover the examination is a long way off, and young men do not always look forward.

1446. (*Chairman.*) Does any knowledge of steam enter into the college sheet?—No, I think not. Perhaps if I had proposed to add steam as well as surveying to the college sheet I should have done better. I was not thinking of steam at the moment.

1447. An officer if he knows anything of steam must be a much better officer than if he is ignorant of it?—Unquestionably.

1448. I was reading a lecture of Mr. Laughton's the other day in which he states that Captain M'Clintock took the place of the chief engineer in the engine-room ; are you aware of that?—Yes, he worked the engines.

1449. You look upon that as an instance in which a knowledge of steam is a very great advantage?—Yes. I believe he learnt that at the old college.

1450. (*Mr. Lingen.*) An officer without at least an elementary knowledge of mathematics would find himself, would he not, cut off from a great deal of the reading and study which is almost necessary on many strictly technical and professional parts of his career?—Unquestionably. He could hardly read a number of the “United Service Journal” with intelligence.

1451. Would that have any bearing upon your answer to the question that you thought that a considerable number of officers might be passed into the service who knew little more than the college sheet?—Perhaps I ought not to have used the word “considerable,” but I do know men without the slightest knowledge of the principles upon which they are working who are nevertheless by the verdict of the service considered very good officers, and they have no more notion of the *rationale* of their day's work than the man in the moon.

1452. What would be the relation of such officers as those to their chief engineers ; would they be at their mercy?—Possibly they might have picked up some practical knowledge of steam, or they might know enough of it to render them in a sense independent of the chief engineer, but if you asked them, for instance, what was the force driving the engines, they would probably tell you steam instead of heat.

1453. But for all practical work connected with the engine, a man might very well do without knowing anything of mathematics?—Yes, he would very soon find out what was the most economical rate of speed to proceed at, and a variety of things that in fact bear the same relation to a theoretical knowledge of steam that the college sheet does to pure mathematics ; and if you will allow me to suggest the addition of a fair practical knowledge of steam, to what I have said about the college sheet, that would embrace all that I meant to say.

1454. (*Mr. Lingen.*) You think on the whole that the compulsory examination which an acting sub-lieutenant must pass before he can get his commission as a lieutenant is somewhat unduly high?—Yes, and I think that there are too many subjects.

1455. (*Chairman.*) There are eleven subjects altogether, but a man might fail in several of them, and possibly might neglect some of them altogether, and yet pass a very fair examination?—I was not aware that I was going to be examined, or I would have looked into that matter, I am not sure but

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what I might say that if a man goes in for two or three subjects and obtains a good percentage of numbers in them that ought to be enough. Of course it is for the Admiralty to decide what shall be the subjects that must be passed in.

1456. (*The Rev. H. A. Morgan.*) Did you read any dynamics?—Yes.

1457. Is it not much more satisfactory to have some knowledge of that subject; to know, for instance, that a projectile travels in a parabolic path?—There was no pressure brought to bear upon me. On the whole I was satisfied with the result of my studies.

1458. We find in Cambridge that when men are considerably older than others they do not do so well in examinations?—I certainly think so. When I went in I was over 46, and I had been then nine years away from anything except practical work.

1459. Do you not think it desirable for an officer who has taste for mathematics to acquire some knowledge of conic sections?—Yes.

1460. You think it is much more satisfactory for an intelligent officer to have an acquaintance with the properties of the ellipse and the parabola if he has capacity for such studies?—Yes, undoubtedly. I would foster that taste to any extent as far as time allowed.

1461. (*Mr. Lingen.*) In the case of those officers who had no taste or capacity for mathematics, whatever other studies they might take up or had a capacity for, to that extent you would say that for professional purposes they were at a disadvantage, seeing that mathematics do very decidedly enter into the professional ability for the higher classes of naval work?—Yes, but of course, as you are aware, languages are extremely valuable to a naval officer, and sketching also.

1462. No doubt that is so when he comes on shore, but it is less so at sea?—I believe that there is no one thing in which most of us feel our deficiency more than in the fact that so few of us are linguists. I am sorry to say, frequently a foreign officer comes on board one of our ships and it is rare to find anybody that can talk to him.

1463. But you would still think, would you not, that it was the object of the college to throw its chief teaching strength on the mathematical side?—Most certainly I should say so, giving a man an opportunity of laying up a store for future use, and of doing something there that he could not do afterwards at sea on board ship.

The witness withdrew.

Adjourned to Monday next.

At 22, New Street, Spring Gardens, Monday, 4th December 1876.

PRESENT :

THE REVEREND O. GORDON, B.D. IN THE CHAIR.

THE REVEREND H. A. MORGAN, M.A.

R. R. W. LINGEN, Esq., C.B.

MAJOR DONNELLY, R.E.

C. D. LOVELESS, Esq., Secretary.

Lieutenant
S. Burney, R.N.

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LIEUTENANT STANLEY BURNLEY, R.N., examined.

1464. (*Chairman.*) You have passed through the course of study as sub-lieutenant at the Royal Naval College?—Yes.

1465. When did you leave the college?—In the beginning of October this year.

1466. And you have obtained your promotion to the rank of lieutenant since?—Yes.

1467. Previous to going to the college, were you on board the "Britannia"?—Yes.

1468. When did you leave the "Britannia"?—In July 1870.

1469. Then you have been at sea for six years?—I have been home a year. I was at sea about five years.

1470. You passed, did you not, in the first class on board the "Britannia"?—Yes. I left the "Britannia" with a first-class certificate.

1471. In what ships did you serve after leaving the "Britannia"?—When I left the "Britannia" I went to the sea-going training ship the "Trafalgar" for 15 months, and there was a naval instructor there.

1472. Where did you go in that ship?—I went out to the Mediterranean.

1473. How many naval cadets were there in her?—Eighty.

1474. Had you more than one instructor there?—Yes, we had three.

1475. When you left that training ship, where did you serve?—I went to the flag ship out in the Pacific, and we had a naval instructor there all the time.

1476. Did you continue in her during the whole of your time?—Yes, during the whole of my time,

until I took passage home in the "Reindeer" sloop, so that I had been all my time with a naval instructor.

1477. Did you retain all the knowledge which you brought out of the "Britannia"?—Very nearly; I learned a great deal extra in the sea-going training ship, because mechanics and hydrostatics I did not learn in the "Britannia," but we were taught them in the "Trafalgar."

1478. Did you advance in your mathematics?—Yes, in the "Trafalgar" I did, and I kept it up tolerably in the "Repulse," but I did not advance in it. I went back a little, because you cannot devote time to your mathematics in sea-going ships.

1479. Did you find the instruction of great use?—Yes, in keeping the work up.

1480. Could you have got on as well by yourself, do you think, if there had been no instructor?—No.

1481. What was the extent of your mathematical knowledge when you came to the college at Greenwich; how far had you gone?—I had gone through nearly all that I had to go through in the college.

1482. Had you gone through quadratic equations?—Yes, I had gone through all the algebra.

1483. To the third progression?—Yes.

1484. And through the theory of logarithms?—Yes, I had gone through all the algebra.

1485. And geometry as well?—No, that I was not well up in; in fact I had not learned further than three books before I joined.

1486. Were you up in trigonometry?—Yes, in that I had done pretty well.

1487. Could you solve the spherical triangles when you came to the college?—Yes.

1488. Did you find the instruction in the college quite sufficient to carry you on, according to your abilities?—For myself I did, but not for others.

1489. Supposing you had been promoted from the class of acting sub-lieutenant to some higher branch of study in the college, should you have been prepared for it; for instance, supposing you had been transferred to a higher class amongst the voluntary students?—No, I do not think so. I could not have devoted my attention to more than I had to do with; there were a lot of new subjects that I had to pick up in.

1490. But you found all the assistance that you wanted in your mathematical studies?—Yes.

1491. How many entered the college at the same time with you?—Only five besides myself.

1492. Did they go through exactly the same course?—Exactly the same course; but some of them could not keep up at all.

1493. Some subjects they were not fit for?—No. Some of them had not learned mechanics at all, and they had to learn the whole of the mechanics and hydrostatics in the short time allotted to us, and it was almost impossible to do so. I could go on all right because I had been through it before.

1494. When it was found that any could not keep pace with you, were they separated from you?—No, they still kept on the same.

1495. There was no attempt made at classification?—No, there could not be, because there is only one instructor there in those two subjects.

1496. Was it your impression that the sub-lieutenants generally at the college made the best use of their time?—Yes, certainly.

1497. All of them?—I could not say all; there were a few exceptions of course, but there were some of them worked very hard the whole of the time that they were there, but they were not able to pass the examination at the end.

1498. Did many of them have private tutors?—Yes; in our class, I think, there was only one who did not.

1499. And that was a class of six?—Yes.

1500. Had you a private tutor?—Yes, all the time I was there.

1501. Do you think that it was generally known in the college that so many sub-lieutenants had private tutors?—Yes, it must have been.

1502. Was it approved of?—Yes, I think so.

1503. Or was it rather ignored?—I do not think so.

1504. Had you more than one private tutor?—Yes; I had one for physics, steam, winds, and currents, and one for mathematics.

1505. All at the same time?—Yes, going on nearly all the time I was there.

1506. Were you paying them 3s. 6d. an hour; is that what they pay?—That is generally what they pay.

1507. Was Mr. Fowler one of those private tutors?—No, I did not have Mr. Fowler; a few did. Mr. Diamond is the gentleman that takes most.

1508. Is he an old naval instructor?—He was the man that used to work them up at Portsmouth when the college was there; he was a very old hand at it.

1509. But not a naval instructor?—I do not think so. Mr. Fowler is a naval instructor.

1510. Are there any young clergymen who give private instruction?—Not to my knowledge.

1511. Was there always good order kept in the study?—Yes, always, if the instructor was there.

1512. Is not the instructor always present in the study?—Nearly always, but not quite in our study, because the instructor has to go away to give a lecture in the course of the morning, and if he thinks he can trust his class, he leaves them, but if not, he will send them another instructor, so that they are generally quiet.

1513. You never noticed any disorder or irregularity?—Very seldom. Sometimes if the instructor went out for a minute or two, there might be a little confusion.

1514. There was no noise except on rare occasions?—No.

1515. (*Mr. Lingen.*) I think you said that you were 15 months on board the training ship?—And in the "Trafalgar." I was 15 months on board each.

1516. And there were 80 cadets in that vessel at the time?—Yes.

1517. Those 80, of course, could not all be performing officers' duties; were they acting as seamen? did they go aloft?—They went aloft sometimes to learn drill.

1518. Had you not on that training ship much greater time for attending lessons than you would have in an ordinary service vessel?—The hours of study were the first consideration, almost as much as if we had been on board the "Britannia."

1519. By study do you mean lessons and books?—Yes; mathematics and that sort of thing.

1520. You were not a longer period, were you, on that vessel than is usual in the service, owing to your having passed through the college as a distinguished student there?—That made no difference; we all left the "Trafalgar" at the same time.

1521. So far as you have seen of the service at present, do you think that the course at Greenwich includes a greater extent of subjects than a naval officer absolutely requires to know for the intelligent discharge of his duties?—No; but I think that they ought to be allowed a little longer time, optional if they like. I do not think that the six months are enough for some that have left the "Britannia" with a third class certificate, and that have been without a naval instructor all the time, and who have come to the college knowing scarcely anything. It is all new to them, and six months is a very short time for them to pick up everything that they require.

1522. With regard to your own knowledge of the service, so far as it has gone, you do not think that they were taught anything superfluous or unnecessary in the college?—No.

1523. Can you see a connexion between your studies and your future duties?—Yes; it will all come in by-and-bye, especially for gunnery duties.

1524. (*Chairman.*) Was the examination which you passed on leaving the college much more difficult than the examination which you passed on leaving the "Britannia"?—Yes; there were a great many new subjects altogether.

1525. But some were left out, were they not?—Very few.

1526. For instance, history and geography?—I had no history in the "Britannia"; we had physical geography; and I consider the instruction in winds and currents replace that.

1527. You think that the new subjects brought in do more than counterbalance the subjects that are left out?—Yes; or it was so in my time, because they have got a lot of new subjects in the "Britannia"; we did not learn Latin and all that which they do now.

1528. (*The Rev. H. A. Morgan.*) How many hours of instruction per week had you on board the "Trafalgar"?—We had three hours every forenoon, and about two hours in the afternoon.

1529. You did not work on Saturdays, I suppose?—No, not on Saturdays; we had nearly 24 hours a week.

1530. Was that kept up regularly?—Yes; scarcely anything ever took us away from our studies.

1531. I think you stated that you came back from the last station in a small ship; had you a naval instructor on board that ship?—No; we had not an instructor, but the captain had recently left the college, and he kindly taught us himself—of course that was entirely optional on his part—if he had not done that we should have been neglected.

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1532. How long were you in that ship?—We were about six months coming home.

1533. If it had not been for that captain, you might have forgotten a good deal, might you not?—Yes; I picked up a good deal with him.

1534. When you were at Greenwich, why did you have private tutors?—Because I could not have got up all my new subjects without them; for instance, the physic lectures were so few that I could not possibly have got my first-class certificate in physics, or in winds and currents either, if I had not availed myself of private tuition, because they were entirely new subjects to me; and in steam as well.

1535. If the instructor in that particular branch of study had had more assistance, do you think that he might have done as well for you as a private tutor?—It is not that. He gave us a lecture once a week nearly all the time we were there; but that is not enough for a new subject. I think they ought to have some voluntary lectures in the afternoon after the study is over.

1536. If he had gone on with you in your room, say for an hour or so every afternoon, or had an assistant to do this, you might have gone considerably further?—We had an assistant.

1537. But you did not get sufficient instruction from the assistants?—No; because they did not give us enough extra lectures. We had only three extra lectures in physics for the last two months. If they gave us an extra lecture after the school hours voluntarily, that would make a great deal of difference.

1538. I think you said that you had a private tutor for winds and currents, and steam; had you not sufficient instruction in steam in the college?—There was sufficient instruction, but it was a subject which I could not pick up easily. On winds and currents we had no lecture at all for the last two months that I was there.

1539. When you were in the lecture-room, did the instructors, as a whole, give you as much attention and assistance as they could?—Yes; in the physic-room they go through all the experiments to show us everything clearly.

1540. Did you find that some teachers took more interest in their work than others?—No. I think that they all took an equal interest; the instructors all worked very well, I think.

1541. In fact, you had a private tutor, because the time at the disposal of the instructors for your tuition was not sufficiently long?—Yes. Of course, I need not have had an instructor, but then I wanted to obtain a first-class certificate. I could have passed without it, because I passed the examination that they gave us on entering; but there are many there who could not have done so; there are many there who have private instruction nearly all the time that they are there.

1542. Simply in order to pass, and nothing else?—Yes. For instance, in trigonometry and mechanics course that we go through, we are allowed two months, and some of them do not know anything about either subject when they go in there, and it is impossible for them to pick up these two subjects in two months, and go right through them; they cannot possibly do it.

1543. (*Major Donnelly.*) Did you find that the fact of having in the same class both backward students and others more advanced tended to keep back the more advanced students in their work?—Yes.

1544. Why?—Because in one study that I was in for instance, there were so many always wanting to ask the instructor for assistance, that instead of going to him, they would come to the more advanced ones and get them to show them. Of course, we could not help showing them, because it is just a matter whether they are kicked out of the service or not; but, of course, that detained you a great deal in that way.

1545. In the case of the less advanced students, is there generally a feeling of grievance amongst them because they are put into the same class with more

advanced students, and that they have to keep up with them?—Of course they find it very difficult to keep up, especially in the course of mechanics and trigonometry, that is the one which I fancy is most difficult for them to work in, and there are only two months allowed for it. The instructor has two classes, one that has been there about a month, and the other which has just joined, and when he is explaining something on the board to the more advanced class, the other class has no assistance, and they have to wait, therefore, until he has finished with the other class before they can get any assistance; and of course all that time is thrown away.

1546. (*Mr. Lingen.*) Do you know any instance of an acting sub-lieutenant who has passed out in the first class without having had one or more private tutors?—Yes, I do.

1547. Do you recollect anything special in his circumstances; was he an unusually good mathematician, or was he older, or was there anything to account for it?—He was not older; he had very good abilities, and he kept his work up all the time since he left the "Britannia."

1548. But you do not think, although you yourself passed out of the college in the first class, that you would have felt confident that you would have got a first-class?—I should not have felt confident, but I was going in for more than that; I was trying for the Beaufort Prize as well.

1549. I think you said that on board the "Trafalgar" lessons, rather than actual seamanship, were the object of the training?—Yes, that was so. I do not think it was supposed to be so, but it was.

1550. As a matter of fact, a sailor who learned all his seamanship on board the "Trafalgar" would be rather a landsman at the end, if he never saw more active service, would he not?—He would, certainly.

1551. Do you think that if three months were taken off the service in the "Trafalgar," and it was made 12 months instead of 15 months, and the three months were added to the time at the college, that would be a change for the better?—I think so, certainly; but you know there is no sea-going training ship now, they are all done away with.

1552. Do the young gentlemen pass straight from the "Britannia" to a regular sea-going ship?—Yes, they go straight to a regular sea-going ship, and perhaps they may be without a naval instructor all the time until they come home and pass the college.

1553. So that, in that respect, your own instruction on board the "Trafalgar" was something over and above what the present acting sub-lieutenants get?—Yes, only they have two years in the "Britannia" now, and we only had one year.

1554. Then, on the whole, they would have nearly the same time?—Yes, on the whole, they would.

1555. What number of hours per day, including college attendances and your own attendance with the private tutor, did you work, do you think?—I think I worked about 11 hours a day all the time that I was there, all through the Midsummer leave, and everything.

1556. How did your health stand it?—Pretty well.

1557. Was not that an exceptional amount of study?—No; there were several who did as much as I did, who were anxious to get their first class, and to pass.

1558. Supposing that the college staff had been more numerous, do you think that you could have achieved the same results with a less amount of study than that?—Yes, I think so, if I had had more lectures in physics and winds and currents than I had.

1559. I presume that you must have felt that you could not very long have gone on with such a strain as that?—No, I could not.

1560. But supposing the course had been extended, as you have thought it might be at the college, we will say 9 or 12 months instead of 6, at that rate of study it would have been more, probably, than you could have stood?—Yes, but then you would not have worked so hard if you had had that time. I do not think that if they did extend the time, a first-class

man ought to be allowed more time, it would be too much.

1561. Will you explain that a little more?—I mean that if they extended the course to nine months optional, to remain there nine months or not if they wished, a man who intends to take a first-class and win his promotion by it ought to be made to pass at the end of six months.

1562. (*Major Donnelly.*) If the Professor of Physics had several assistants who could have worked through the lectures with you afterwards, I suppose that would have saved you the expense of a private tutor?—Yes, we had assistants, but those assistants did not give us extra lectures in the afternoon.

1563. I mean assistants who would work you through the subjects of the lecture which had been given during the study hour?—We had those. For instance, from two to four in the physic afternoons we used to go into the lecture with the professor. He lectured for an hour, and then he gave us some questions on physics, and we would go up into our studies and the assistant came up and helped us for the other hour of the afternoon. For instance, in steam we got two lectures a week, but the last month that we were there we got in the afternoon an extra lecture twice a week, from four to five; and if they did the same as that with physics it would have made a great deal of difference. If the assistant gave us a lecture, say not the same afternoon, because that would be too much, but some other afternoon in the week, it would be a great help.

1564. And the same, I presume, with mechanics?—Yes, but if they had a longer course, then they would have more time for mechanics. If, instead of two months, they had three months course for mechanics, they would not want a longer time, they would be able to go through the whole course properly.

1565. That would enable the less advanced students to get through?—Yes.

1566. (*Chairman.*) How much did your private tuition cost you altogether?—I do not know, because my father settled all that, and I do not know what he paid. My lecture in steam alone cost me 5*l*.

1567. Of course it is a very serious thing for a young man to lose his place in the Navy when he was 21, but it would be no great harm if he was prevented coming in at the age of 15; do you think that it would be a good thing to make the examination on leaving the "*Britannia*" stricter than it is, with the view of keeping out such persons as were then found to be deficient?—No, I do not think so, because I fancy that those who do get kicked out at college always manage to pass in navigation, which is the most useful to them; and if they had a little more time to get up the subjects which they have not touched, they would be able to get through all right.

1568. I think you were not instructed in physics on board the "*Britannia*"?—No.

1569. But were you not subsequently by the naval instructor?—No, not until I came to the college. I had never looked at the subject at all until then.

1570. Will you be so good as to look over this set of questions (*handing the same to the witness*) and tell me whether the examination in the college differs very much from that? I may say that there are no optics and electricity in it, but the other subjects are very much the same.—Those are the ordinary sort of questions that they would set us.

1571. You would consider that a difficult paper for a youth under 15 to pass?—Yes, I would rather.

1572. Even if he had two years instruction on board the "*Britannia*"?—Yes, I would rather.

1573. Could you answer all those questions?—Most of them.

1574. You have only one paper set you in the final examination in physics, have you?—That is all, only one paper. I might also state that there is another difficulty with respect to the physic paper; the man that sets it is an outsider altogether, and he does not know exactly what course we go through. I have known cases of questions being set that we have not

had in our lecture at all, which of course ought not to be.

1575. Does Mr. Goodwin set the paper?—Mr. Goodwin does not set the paper. I do not know who sets the paper in physics, but it is some outsider altogether.

1576. (*The Rev. H. A. Morgan.*) Would it be possible, do you think, for a midshipman in a small ship on some distant station where he has many duties to attend to with regard to the working of the ship and so on, if he had a naval instructor on board, to keep up what he had learned in the "*Britannia*," and perhaps even to advance upon that, and at the same time to learn all the various duties connected with the management of a ship?—Yes, he might learn his duties, but then the captain would of course have to make exceptions for him, because there would be so few officers in a small ship that they would have more duties to do.

1577. Do you think that every midshipman, during the five or six years that he is at sea, ought to have some instruction?—Yes, some officer or somebody who recently had left the college might give him instruction.

1578. And it is the case, is it not, that in many small ships they receive very little instruction?—Very little indeed; in fact none at all, I may say.

1579. And the result of that is that they come to Greenwich very ignorant?—Yes, very ignorant indeed.

1580. On the whole, should you say that those midshipmen who have had the advantage of instruction on board ship are better prepared when they come to Greenwich than those who have not?—Yes, I think so. In some cases in small ships they do get assistance; some officer takes it in hand to teach them, and that is as good as an instructor.

1581. I suppose that for the first two or three years of a midshipman's life at sea, the examination at Greenwich is too far off to stimulate him to work?—Yes.

1582. Do you think that the half yearly examinations which they have now on board ship will tend to keep the midshipmen better at work than they have hitherto been?—Yes, I think so, and I think they ought to be kept up, and more made of them.

1583. (*Chairman.*) Do all the acting sub-lieutenants take up all the subjects, or do any of them make a selection and leave some out?—No, they have no option at all; they must take them all.

1584. Still, there are two or three subjects that a man might be absolutely ignorant of; for instance, physics, to which only 100 marks are allotted out of 1,500?—Yes, he might pass without getting any marks in that subject at all, but he would have to make up for it in something else.

1585. Then his going in for that subject would be only nominal?—Yes, that is all, and he would have to pick those 100 marks up in some other subject; he must get 750 somehow.

1586. And he might get those out of any subjects that he could?—Yes.

1587. And he might be totally ignorant of others?—Yes, he might be totally ignorant of one or two subjects, but I do not think that many would trust to that.

1588. (*The Rev. H. A. Morgan.*) Should you say on the whole that the private tutors at Greenwich endeavour to give the men a real sound knowledge of the subjects that they teach, or do they cram them as much as they can?—Yes, they try to cram them as much as they can. If they had an instructor who would take a voluntary class in the evening at the college, we might do away with private instruction, nearly altogether.

1589. (*Chairman.*) Do you think that anybody ever got through who was absolutely ignorant of navigation and nautical astronomy, to which 400 marks are allotted, by making up the requisite number of marks in other subjects?—That would be a subject which nobody would like to fail in, because navigation

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S. Burney, R.N.*

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is what everybody pulls up in. Sub-lieutenants who are plucked have three months' time taken away from them when they are turned back until they pass again. They are only allowed six weeks to work up, and I think that they ought to be allowed three months to work up.

1590. They are obliged to go in for the next examination but one, are they not?—Yes, but they ought to have an interval of three months, since they are deprived of three months' sea time.

1591. (*Mr. Lingen.*) You stated that the college course contained, you thought, no superfluous subjects, and you were then asked whether, in the case of cadets leaving the "Britannia" who had passed in the third class and who passed ill, they might not be excluded from the service of the state with less hardship to themselves than at a later stage, and I understood you to say that you thought that although they might not be able to pass in the higher subjects, still in the practical subjects of navigation and so on they would be able to pass and might therefore become tolerably competent officers; is it not your opinion (as you may look some day or other to have command of a ship) that if you had an acting sub-lieutenant who had come out of college, we will say in the first class, and another who had come out of the college after being plucked, that in all probability the one would be a much more practically efficient officer than the other, or do you think it would only be that the one would probably be a more generally intelligent man?—That is all. There are some who have been turned out of the service who are much better seamen than others who remain in.

1592. You would think so if you were in command of a large ironclad?—I do not think I should go by that at all, by the class that they took at Greenwich, to trust them in charge of a watch or any seaman's duty.

1593. You think that if you had two lieutenants, one of whom took a first class at Greenwich and the other a third class, the amount of theoretical knowledge which those two degrees would imply would be no guarantee at all that the one would be a better officer than the other?—No, it would not necessarily be so.

1594. What then would be the advantage of the advanced studies, would it be simply that he was probably more intelligent?—Yes, probably that he was more intelligent, and it would come in useful to him if he took up gunnery duties, or anything of that sort, which of course a man who had not passed out well from Greenwich at the end of his course would not attempt to do. There is a great deal of theoretical work which has to be learned for gunnery duty, you have to know all the ground work that we learn at Greenwich now for that.

1595. Every lieutenant on board a ship of war might be called upon, might he not, to perform gunnery duties in the course of the service?—Yes.

1596. And a lieutenant who had left Greenwich with a third class only, if a lieutenant with a first class certificate happened to be killed or wounded in an action, would be less competent to manage the ships batteries, would he not?—I could not say that exactly. He might be able to manage the ships battery, but he would not have any idea of the theoretical part of gunnery, although he might be able to carry on the drill in a battery well enough for a short time.

1597. The difference then between a first class and a third class for the practical purposes of the navy

you do not lay any very great stress upon?—No, I do not.

1598. (*The Rev. H. A. Morgan.*) Should you say that taking the first class men, they were a smarter and better class of men all round and with more vigour and energy and with greater power of endurance and capacity for doing good work and so on?—Yes, I would rather trust them, but for a man to be a good sailor it comes to him almost as a talent. He might not be able to do anything else but he might be a splendid sailor on deck. You might not be able to trust him in other things because he might be lazy, but for energy or perseverance, or anything of that sort, I would sooner take the first class man.

1599. (*Major Donnelly.*) As I understand your position, you would not select a man to put him in charge of a watch, or as a seaman under you, on account of his theoretical abilities; but given the good seaman, you think he would be the better for the more theoretical attainments that he managed to acquire?—Yes, certainly.

1600. (*The Rev. H. A. Morgan.*) On the whole, if you were in command of a ship, you would sooner have first class men than third class men as officers under you?—Yes, certainly, especially if they were equal in other respects, and then of course I would sooner choose the first class men.

1601. (*Mr. Lingen.*) You know of nothing in sea service that a first class man would, as a matter of course, be able to do which a third class man would not be able to do?—I do not know exactly; but in the case of a ship getting on shore or anything of that sort, of course all your theoretical work comes in useful then.

1602. (*Chairman.*) Is there anything further which you would wish to state to the committee?—Perhaps I might be allowed to say that after cramming in the "Excellent" for three months, we leave on the next day and come straight to the college on the Monday, so that you have to begin a new subject altogether after going through a cram of three months, and you really cannot set your mind to work at the college for about a fortnight after, and all that time is wasted. There ought to be a slight space of about a fortnight between the two. I found it very difficult when I came to Greenwich to apply at once to the course of study there. A great waste of time is also found in the sights that have to be taken while at college. You have to go out in the middle of some instruction to try and get a shot at the sun. You wait for about an hour or more for the watch by which the time has to be taken (on account of there only being one watch); then at the end of that time perhaps the sun goes in, and the whole of that time is wasted. Or very likely, anxious not to be absent from study longer than you can help, you rush out to take a sight, and owing to the hurry, something goes wrong with the sight, and it is a case of so many marks lost. Much better regulations might be made for the sight-taking in the way of more watches being supplied, &c.

1603. (*Major Donnelly.*) Did you go to the "Excellent" immediately on coming home from the sea-going ship?—Not now; we used to do so; I think they give them leave now before going to Greenwich; but when I came home we had to do so. If you come home just after the joining, you have to wait till the next joining; you have to wait about three weeks, which I managed to do, or I got about 18 days' interval.

The witness withdrew.

*J. C. Fairie,
Esq., R.N.*

J. C. FAIRIE, Esq., Sub-lieutenant, R.N., examined.

1604. (*Chairman.*) Have you just left the college at Greenwich?—Yes, in the batch before last, about six weeks ago.

1605. In what class did you pass out?—Third class.

1606. What proportion of marks is required for a third class?—We ought to get 750 out of 1,500.

1607. You were in the "Britannia," were you not?—Yes.

1608. For what time?—For 15 months.

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1609. In what class did you pass out of the "Britannia"?—Second; I passed in seamanship and navigation as well. I got a first in seamanship, and a second in navigation.

1610. But that did not affect your class, did it?—That was just after they did away with classes; they had no regular class for both examinations; they separated the two.

1611. How long were you at sea after you left the "Britannia"?—Six or seven years; I do not know the exact time.

1612. What ships were you in?—The "Bristol" sea-going training ship, the "Megara," the "Blanche," and the "Pearl."

1613. Was there a naval instructor on board each of those ships?—Yes, there was one in the "Bristol" and in the "Pearl," but not in the others.

1614. How long were you on board those ships that had no naval instructor?—I was in the "Blanche" for more than four years without a naval instructor.

1615. Did you endeavour to keep up your knowledge without that aid?—I managed to keep that up a little, I think.

1616. Did you know as much mathematics when you came to Greenwich, after you had passed through the "Excellent," as you did when you left the "Britannia"?—No, certainly not.

1617. Had you forgotten a good deal?—Yes.

1618. Had you forgotten your mathematics entirely?—I had not been working at them for a long time; I had forgotten them almost entirely, I think.

1619. Could you have worked simple equations when you came to the college?—Yes.

1620. And quadratic equations?—No, I do not think I could.

1621. Had you forgotten your Euclid also?—Entirely.

1622. And your trigonometry?—I knew a little of trigonometry.

1623. Did you know the simple formulas; for instance, could you find the value of cosine ($A + B$) in terms of sine and cosine of A and B ; could you have found that out?—I do not think I could.

1624. Did you find the instruction that was prepared for you at the college quite sufficient to get you on?—I thought it better to take a private tutor.

1625. Did you do so the whole time you were there?—No, for the last part, between two and three months.

1626. What did he instruct you in?—In mathematics solely.

1627. Do you think that you would have passed without his aid?—I think it is very doubtful.

1628. What number of marks did you get?—I got 870, I think.

1629. Did you, in the course of your studies, feel the want of greater assistance than you found in the college?—Yes, I did not think there was sufficient assistance, or I would not have taken on this private tutor.

1630. Were you industrious the whole time?—Yes, I always worked in school hours, and was always at school.

1631. Do you think that the sub-lieutenants generally are industrious there?—Yes, I think so; it is the exception not to be, I think.

1632. Did you find the discipline strict?—No, the discipline was very easy.

1633. You could come up to town, I suppose?—Yes, we came up to town quite enough. We had not much time to spare, but we were allowed to come to town once a week until 12 at night. We were allowed to come up from the time that study was over on Saturday until Monday morning.

1634. Was there good discipline always kept in the studies?—Yes, I think there was.

1635. Of course there must have been some noise from the students going up to consult the instructor, but there was never any unnecessary noise?—Never, in the presence of the instructor. I never heard the slightest noise.

1636. Was the instructor often out of the room?—Very seldom, except for the last three months that we were there, when we were sometimes left without an instructor for the first hour.

1637. You had never noticed much or any irregularity in the study?—No, I think they were always quiet in the room.

1638. Could you work the college sheet when you came to Greenwich?—Yes, I could have done that, I think.

1639. Efficiently and correctly?—Yes.

1640. Do you think the students generally can do that when they come to the college?—I think they could all of them. It is the exception not to be able to work the college sheet, nearly everybody, I should think, could do it.

1641. (*Mr. Lingen.*) Do you think that the studies which you passed at the college will be of practical use to you in your profession afterwards?—I think so.

1642. Do you think that you have got more knowledge than is contained in the mere working of the college sheet?—Yes, I think so, it makes you see things more clearly, I should think.

1643. (*The Rev. H. A. Morgan.*) How many were there in your class in the college?—Five. There were six at one time, but one left on sick leave.

1644. Were some of them distinctly more advanced than others?—Yes, there were two that knew considerably more than the others, and there were two of us who were considered rather the worst.

1645. Was the lecture addressed more especially to the advanced rather than to those who were not so much advanced?—No.

1646. Could you obtain as much instruction from the teacher as was necessary in the lecture room?—Sometimes you had to wait till your turn came to have something explained which you did not understand, and sometimes there were two or three waiting, at other times there was only you.

1647. Why had you a private tutor?—I was afraid that I should not pass without his assistance.

1648. Do you think now, after what you have seen of the examination, that you would not have passed without a private tutor?—I do not think so.

1649. If you had had more help, say in the evening from one of the instructors, could you then have passed without a private tutor?—I think that would have made a difference certainly, because if you did work in the evening and showed your work in the morning to the instructor you did not lose the time that otherwise he would be explaining it to you.

1650. So that if you had had additional instruction you might have done without a private tutor?—I think so.

1651. When you were in the "Blanche" for four years, had you no naval instructor?—No; we had a lieutenant doing the duty some time.

1652. Did you obtain from him as much instruction as you might have obtained from a naval instructor?—No, I think not.

1653. Did you manage to keep up in the "Blanche" all that you knew when you first went on board?—No, it was only a short period that we had this instruction.

1654. Then during the greater part of the time you were forgetting what you knew?—Yes.

1655. Could you, when on board the "Blanche," have made progress in the subjects which you worked up in the "Britannia," and at the same time have attended properly to your duties on the ship?—I think not; we should not have had time. In a small ship you have a great deal more duty to do, the midshipmen and sub-lieutenants do what lieutenants would do in a larger ship where there were a great number of them.

1656. Could you have given an hour a day to mathematical studies, so that you might have kept up what you knew when you came there?—Yes, if an hour a day would do it.

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1657. Could you have given two hours a day?—No, I could not have given two hours a day on an average.

1658. (*Major Donnelly.*) You and the other three acting sub-lieutenants who joined at the same time as yourself worked through precisely the same course in mathematics, did you not?—No; there was one who had been away for some time on sick leave, and who joined us after we had been there some short time. The others were all the same.

1659. Did you find much difficulty in keeping up with the more advanced sub-lieutenants?—Yes, I found that I did not know enough. I found that I could understand things sufficiently, but I had not time to keep them up again; my memory was not sufficiently retentive. I had not time to work them up afterwards.

1660. If the instructor had not gone on so fast, do you think that it would have been better for you?—Yes, I should think so.

1661. (*Chairman.*) When the instructor enters the room, does he give what you call a lecture, or does he confine himself to giving instruction to individuals; does he give one lecture to all?—You do not always have a lecture, but in the case of a lecture he does give one lecture the same to all exactly, but in some cases they are just given so many questions on paper to work out, and the things they are unable to do are taken to the instructor.

1662. Suppose he gives a lecture and the subject of his lecture is the treatment of equations of two unknown quantities, he would do that on the black board, would he not?—No, I think not; I think the average number of sub-lieutenants going there now can do quadratic equations.

1663. I said equations of two unknown quantities, involving x and y ; would he do that on the board for the benefit of all?—No, he would inquire if any one did not know how to do it; if one half the class did not know how to do it, he would do it on the board, but in the case of only one or two not knowing he would show them individually.

1664. Those students who were not equal to that who could only solve an equation of one unknown

quantity would not be obliged to be following him on the black board, but would be engaged on their own work?—Yes.

1665. They would not be interrupted in fact?—No.

1666. (*Major Donnelly.*) Were you working the same set of examples all the time in the same class?—No, not always. You begin in the same class, and you have a given amount to do in each book. Some get further ahead than others in the book.

1667. Do you go on from one rule to another together, or are some carried on in advance of the others?—Some go on in advance.

1668. (*The Rev. H. A. Morgan.*) Do you think it would be a good thing if the course at Greenwich for sub-lieutenants was extended in length?—No, I should not think it would.

1669. You think that six months is long enough?—Quite long enough, I should think.

1670. (*Mr. Lingen.*) Will you explain just what the college sheet means?—The college sheet is the name given to the practical navigation sheet.

1671. (*Major Donnelly.*) But there is a kind of syllabus, is there not, called the college sheet?—Yes; it is called the college sheet, but it is only the practical navigation sheet.

1672. It is all printed out on the sheet, or was, was it not?—Yes; it is now. The old college sheet used to have two or three questions in arithmetic at the end besides.

1673. (*Mr. Lingen.*) But there is at this time an actual piece of paper which is called the navigation sheet?—Yes.

1674. (*Major Donnelly.*) How could one get hold of one of them?—I do not suppose that you could get the old college sheets anywhere.

1675. Would they not be printed in the regulations?—You would find them in the old navy list, I should think.

1676. (*Mr. Lingen.*) Do they not vary from year to year?—No; it was simply an examination paper.

1677. There were certain definite questions, were there not?—Yes; there were a certain definite number of questions on each subject, only the questions were altered.

The witness withdrew.

*Mr. C. H.
Steward, R.N.*

Mr. CORNELIUS H. STEWARD, R.N.

1678. (*Chairman.*) You are an acting second-class assistant engineer, I believe?—Yes.

1679. And still at the college?—Yes.

1680. How long have you been there?—Two months and four days.

1681. What is the length of your course, supposing you stay there to complete it?—Nine months.

1682. That is to say, the session of nine months?—Yes.

1683. Where did you come to the college from?—From Portsmouth Dockyard.

1684. In what capacity?—An engineer student.

1685. How long had you been under education there?—Five years and nine months.

1686. And did you come straight from there to the college?—Yes.

1687. What is the difference between a second-class assistant engineer and a first-class assistant engineer; does the difference depend upon any examination which you have to pass?—To be a first-class assistant engineer, you must serve on board ship for two or three years, and then you pass another examination for first-class assistant engineer. A first-class assistant engineer is a commissioned officer, and a second class is not.

1688. (*Major Donnelly.*) It is, in fact, a higher rank?—Yes.

1689. (*Mr. Lingen.*) Does the second class become the first in time?—Yes; after a period of three years.

1690. (*Chairman.*) But then it depends upon yourself whether you stay for three years, or whether your

course is finished in one year, does it not?—Yes; the first two students on the list at the college at the end of the first nine months, are chosen for two more sessions.

1691. And then would they become first-class assistant engineers?—Yes. In fact they are acting first-class assistant engineers before they leave the college.

1692. (*Mr. Lingen.*) You mean if they succeed in the examination?—Yes; because they receive a first-class certificate at the end of the first session, which gives them a year's seniority.

1693. (*Chairman.*) Were you selected by examination to come to the college?—Yes.

1694. How many are selected every year?—There are a certain number of engineer students entered into each dockyard every year, say, half-a-dozen, and at the end of their sixth year they pass an examination to come up here; the number who come up varies.

1695. Are you under the instruction of Professor Lambert or Professor Miller?—Professor Miller, and his assistant Mr. Pole.

1696. Do you find that they give you every assistance in the way of instruction that you could possibly desire?—Yes. I think Professor Miller and Mr. Pole are quite as much as any student could desire.

1697. Not only as regards their own abilities and willingness and zeal, but as regards the opportunities that they have, do you think that they have time enough to devote to each of you, according to your

wants?—Yes; I think we get on very well with the mathematics which they teach.

1698. In fact, could you suggest any improvement in the mode of instruction?—With regard to Professor Miller and Mr. Pole, I could not.

1699. I presume that your class are generally extremely industrious?—Yes.

1700. And you are anxious to get on?—Yes.

1701. Of course you may attain a very high position in the navy, and therefore, I may assume that all of your class are very zealous and very industrious?—Yes.

1702. (*Mr. Lingen.*) You come into your places by competition, do you not?—Yes.

1703. (*Chairman.*) Do any of your class ever resort to private instruction from persons outside the college?—No, not while they are at the college. I was obliged to do so when I was a student, but not since I have been here.

1704. (*Mr. Lingen.*) Do you mean when you were a student in the dockyard?—Yes.

1705. (*Chairman.*) But you do not find the want of any extra assistance here; everything is provided in the way of instruction that you wish to have?—Yes, I think so.

1706. (*Major Donnelly.*) Is that the case in the other subjects as well as in mathematics?—There are one or two subjects which I think are rather hurried in order to get through the session.

1707. Which do you refer to?—I refer to engine design; it is a very difficult matter to keep up with the lectures.

1708. Is that with regard to the drawing?—Yes, you have given you the formula for different parts of the machinery, and you have to design it afterwards according to the formula.

1709. Does the difficulty which you feel arise from the want of time, or from any other circumstances?—Simply through the want of time.

1710. Supposing that you were one of those selected to remain on for three years, you would be progressing in that part of your education, you would be doing that the whole time, would you?—Yes, only it would be higher, the second two years.

1711. (*Mr. Lingen.*) When you were in the dockyard, what instruction did you get, did you attend the same school as the naval apprentices?—Yes, only on different afternoons.

1712. From what school did you come to the dockyard?—From Mile End Academy, Portsmouth.

1713. That to a certain extent was a school of professional character, was it not?—Yes, most of the scholars there were passed in as engineer students.

1714. With what amount of mathematical instruction did you enter the dockyard, for instance, did you know arithmetic and algebra up to simple equations?—Yes, much more advanced than that, when I entered the dockyard I was up as far as geometrical progression in algebra.

1715. In geometry how far had you advanced?—In geometry I knew the first six books of Euclid.

1716. How long were you in the dockyard?—Five years and nine months.

1717. On the days that you attended the dockyard school, was the instruction confined to professional subjects;—No, I hardly received any instruction on professional subjects at the dockyard school, it was mostly mathematics.

1718. But mathematics that would ultimately be wanted in your further studies?—Yes.

1719. (*Chairman.*) What age were you at that time?—Between 15 and 16; they enter them a year earlier now according to the new regulation.

1720. (*Mr. Lingen.*) Were you now to have a further career with two branches, might it be open to you to go to sea as an engineer officer, or might you pass into the dockyard service at once from the college, according to circumstances?—No; according to the instructions, you must serve on board a man of war before you can take up a dockyard appointment.

1721. I presume that you have no practical notion of what your duties afloat would be, you have not yet been to sea?—I am acquainted with the nature of my duties afloat. I have not been to sea, but I have been on trial ships when they have been on the measured mile.

1722. That is to say, you have been put there from the dockyard?—Yes.

1723. So far as you can see, do your studies in the college have a direct connection with what you have to do on board ship?—Yes, I think they do.

1724. Are you satisfied that what you are learning is not learning in general, but that it will make you a better engineer, whether you are in the dockyard, or whether you are afloat?—Yes.

1725. (*The Rev. H. A. Morgan.*) How many engineers join the college annually?—The number varies. This year, I believe, 4 engineers, 5 first-class and 32 second-class assistant engineers, have joined.

1726. Of those 32 two are selected at the end of the year, are they not?—Yes.

1727. How many are there generally in the class which you attend?—There are 41 in the class, about 25 of whom are in Mr. Pole's division.

1728. Are you in Professor Miller's or Mr. Pole's class, or both?—In Mr. Pole's division of Professor Miller's class.

1729. Do you think that he can attend to those 25 quite well, and give them as much instruction as you can require?—Yes.

1730. What mathematics did you read in the dockyard school?—We had no arithmetic there; we had algebra and descriptive geometry.

1731. Did you read the differential calculus in the dockyard school?—Yes, and the integral also, and conic sections.

1732. And statics and dynamics?—Yes.

1733. What are you reading now?—I am reading the trigonometry with Mr. Pole. Professor Miller's division are reading the calculus.

1734. You will read differential equations and such subjects as that, will you not?—I am in the second division—Mr. Pole's; we shall not read them; we shall only read conic sections; we shall not go into the differential and integral calculus.

1735. Is it only the higher division that does that?—Yes; only the higher division.

1736. Are the highest mathematics, such mathematics as differential equations and so on, required in what the engineers have to study afterwards; is it desirable that an engineer should read the highest mathematics?—Yes, I think so, because it bears directly upon the subject.

1737. What part of the highest mathematics which you will read in the college do you suppose you will require; will you go over the integral calculus again?—I shall not go over the calculus while I am there; the senior division will.

1738. Is the principal amount of your time at the college given to engineering, to the practical part of the work?—The afternoons are devoted to engine design and engine drawing.

1739. In fact from what you say I gather that you do not read as high mathematics now at the college as you did at the school?—Yes, we go into it much deeper; but the lower division will not read the differential and integral calculus.

1740. Still what you do read you do more thoroughly and more deeply?—Yes.

1741. (*Major Donnelly.*) Do you find that in all the branches of study which you have at the college you have sufficient assistance in getting on with your work, or do you find a difficulty in keeping up?—As I said before, in engine design I find great difficulty in keeping up.

1742. Is that from the limited time of doing it?—Yes.

1743. That is an absolute piece of work to be done, is it not; they give you the conditions of engine design, and you have to work them out in engines?—Yes.

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1744. You say you have sufficient assistance in the way of instruction in mathematics; what are the other courses of instruction which you go through?—We have chemistry and physics lectures, descriptive geometry, and applied mechanics. I hardly think the descriptive geometry is taught sufficiently well.

1745. Have you sufficient assistance in getting up your chemistry and physical work?—Yes, I am very well satisfied with those lectures.

1746. But after the lecture do you find a necessity for the help of an assistant or somebody to take you over the work again?—No, because by reading up after the lecture is over, we can perfectly understand everything that has been done during the lecture.

1747. Then you do not feel the necessity for any more assistance?—No.

1748. Then it is only in the case of engine design and descriptive geometry that you want assistance?—With respect to the engine design I think time is only required, but assistance with the descriptive geometry.

1749. It is a difficult subject, is it not?—Yes, it wants to be thoroughly explained.

1750. Do you mean theoretic descriptive geometry or practical descriptive geometry; that is to say, are the problems taken theoretically in their proof or do you work them out on paper?—We have to work them out on paper. The problems are worked out in the book, but they are very difficult to understand without being explained. It is Woolley's descriptive geometry that we use.

1751. Who teaches you the descriptive geometry?—Mr. Solomon.

1752. Has he not sufficient time to attend to the whole of the students?—I think he has time, but I seem to think that he imagines that we are further advanced than we really are in that subject, he sometimes goes into it much more deeply than I think he should do.

1753. You mean that you cannot follow him so as to keep up with the lecture?—No, we cannot.

1754. (Mr. Lingen.) What is Mr. Solomon's rank in the college?—He is, I believe, an assistant instructor in mathematics.

1755. Is he under Professor Miller?—He takes a different branch of the subject to what Professor Miller does.

1756. (Major Donnelly.) How many has he in the class at a time?—He has about 38, I should think.

1757. All at one time?—Yes.

1758. Are you working out a course of descriptive geometry with drawing instruments on paper, or are you learning the problems in Woolley's descriptive geometry?—We are learning the problems in Woolley's descriptive geometry, and also working problems that are not in that book which Mr. Solomon gives us to do.

1759. (Chairman.) Does not the nature of your profession require a higher knowledge of mathematics than is necessary in the case of any other class of students in the college?—Yes, I think so.

1760. And from your being selected at the age of 15 or 16 we may assume, may we not, that you have all of you very good heads for mathematics?—Yes, I think so.

1761. Otherwise you would not have been selected?—I suppose not.

1762. When you were in the dockyard you were constantly making progress, were you not, in the study of mathematics?—Yes.

1763. Did you find the papers that were set to you, while you were there, increase in difficulty, or did they keep at about the same level?—They were about the same level all through; the papers that were set at the first examination were as difficult as those at the last, but we were not expected to do so much at the end of six months as at the end of six years; we were expected to progress every six months.

1764. But in respect of difficulty the papers are about on the same level?—Yes.

1765. Although you were constantly advancing in knowledge, yet the papers were about the same level?

—Yes, because they embraced the lower subjects as well as the highest which were set at the dockyard.

1766. When you have been there, we will say for two or three years, if a paper were set before you, would you begin by doing the easiest questions, or by doing those that were of a higher character?—By doing the easiest and going right into the others. We first did the easiest because by that means the examiners were enabled to determine whether we kept up the lower subjects as well as the higher. If you work only at the higher subjects you are very liable to forget the lower, and that is the object of setting the papers in that manner.

1767. So that you always began at the foundation and worked upwards?—Yes.

1768. Do you think it possible that a person who goes on to the higher branches of mathematics should forget, for instance, arithmetic, or is that likely?—Not exactly arithmetic.

1769. Supposing that you became a Newton, as perhaps you may do, is it conceivable that you could have forgotten arithmetic?—Not exactly that, but there are certain subjects that you will forget unless you practise them.

1770. (The Rev. H. A. Morgan.) You may forget how to extract the cube root?—Yes, you may very possibly forget if you do not keep it up.

1771. (Chairman.) Generally speaking, as you advance in mathematics you are constantly using, are you not, those branches which you have left behind?—Yes, no doubt that is so.

1772. It is not as if you went out of one problem into the other, but you are naturally working up from the very elements to that point which you have reached,—however, as a matter of fact, the examination papers keep on the same level, only you are expected to do them better?—That is it.

1773. Is that according to any law of progress or are you merely generally expected to do better; for instance, after six months work say, are you expected to get so many marks, that is to say, a definite number of marks, more than you got six months previously?—You are generally expected to do better; for instance, after the first year you are not expected to obtain a fixed number of marks more than six months previously, but to progress generally; after the first year you are expected to do better than after the first six months.

1774. But is that by any fixed law of progression?—No, not by any fixed law, only generally you are expected to progress.

1775. (Mr. Lingen.) Taking your own experience, in order to make a good engineer officer, whether afloat or in the dockyards, is there any part of the course, in the college, for instance, which you think could have given you greater advantages than you have had?—There is one thing which I wish to speak about, and that is, that there are no models provided for us in the engine drawing.

1776. You mean that you cannot see model engines?—No, we cannot.

1777. But you have seen actual engines in the dockyard, have you not?—Yes, I have seen actual ones in the dockyard.

1778. But you would prefer to see model engines with reference to particular questions that are before you?—Yes, with regard to engine drawing, because you have to draw engines, and the only engines that are about are the old "Bee's" engines which are in a shed near the college gates.

1779. And those are not up to the latest improvements?—No, and if you sketch them I do not see that there is very much to be learned in putting them down.

1780. In those exercises, as I understand, which are given you, there is a certain room for invention; you have, I suppose, a certain problem: given engines that will do so and so, and so and so, how to construct them?—Yes.

1781. Models would only be suggestive of the latest improvements; they would answer no purpose.

for the immediate questions which you have before you unless it happened that you saw that the particular model performed the operation that was included in your question; what exactly would you want models for; would you want them to enable you to answer questions, or merely to improve your general knowledge of machinery, by looking at them at odd times?—Not merely to improve our knowledge, but to draw from; we have to make drawings of engines, and in consequence of that we have to go down to the “Bee’s” engines which were invented a very long time ago, and are not up to the mark of marine engines now.

The witness withdrew.

THOMAS CROAD READ, Esq., examined.

1786. (*Chairman.*) You are a naval architect, are you not?—Yes.

1787. Are you still at the college?—No, I left last June.

1788. Had you been there for a period of three years?—Yes.

1789. What were you before you came there?—I was an apprentice in Chatham dockyard.

1790. And you were elected by competition, were you not?—Yes.

1791. Were you elected to come direct to the college?—Yes, direct to the college.

1792. Who conducted the examination then; was it the Civil Service Commission?—No, I think not; it was Dr. Woolley, I believe, or his successor at the time.

1793. (*Major Donnelly.*) Were you at South Kensington?—No, I was one of the first that went to the college. Those of the year preceding me went to South Kensington.

1794. (*Chairman.*) How long had you been under instruction in the dockyard at Chatham?—Four years and a half.

1795. Is that the usual time?—No, five years is the usual time, but by petition the apprentices of the same age as myself were allowed to try for entrance to the college six months before the expiration of that term.

1796. How many of you entered the college at the same time?—Three.

1797. That is the fixed number, is it not?—Yes.

1798. Then you must have been there when the college was first opened?—Yes, in 1873.

1799. And where are you engaged now?—I am a supernumerary draughtsman at the Admiralty at the present time, in the Constructor’s Department.

1800. You were under Professor Miller, were you not?—Yes, the whole of my time.

1801. And under his assistant, Mr. Pole?—Under Doctor Wormell the first year, and Mr. Pole the second and the third year.

1802. Did Doctor Wormell assist Professor Miller in mathematics or in other subjects?—In mathematics, and he lectured to us on descriptive geometry.

1803. Did you find from those gentlemen all the instruction that you wished to have?—Yes, I can speak very highly of Professor Miller and of his assistant.

1804. You never felt the want of any further assistance?—No.

1805. You had no private tutor or instructor of any kind?—No, I never required one of any kind.

1806. Did any of your class of students that you have heard of ever have private assistance?—No, they are quite well enough supplied at the college.

1807. That must evidently be their feeling, otherwise they would have resorted to private tuition?—Yes, I think so.

1808. Were you examined at the end of every year?—Yes.

1809. And were you distributed into classes?—Yes. We had different class certificates according to the result of our examination.

1782. (*Major Donnelly.*) Would you like to see the model of a trunk engine?—Yes, something modern.

1783. (*Mr. Lingen.*) Is there anything besides the provision of models which occurs to you that would strengthen your course of study?—No, I think not.

1784. (*Major Donnelly.*) Have you models to help you with the descriptive geometry?—No, we have not. I think that they would be a great assistance.

1785. You have nothing but the diagrams in the book?—That is all, and they are very difficult to understand on paper.

1810. Did you get a first class certificate every year that you were there?—Yes.

1811. You appear to have got on so well that it is almost unnecessary to ask you whether you could suggest any change in the system of instruction that would be an improvement?—There is one thing which I might mention. The first year we are at college we are lectured in descriptive geometry, and we spend a great deal of our time upon it. That subject is a very important one to us in naval architecture, but we are not examined in it in the final for our professional certificates. I think that we ought to be examined in that subject.

1812. (*Mr. Lingen.*) Are no marks to be got for it?—No marks are got for it.

1813. (*Chairman.*) Will you state what is meant by descriptive geometry?—It is the graphic representation of solid forms by projections on two planes at right angles. This descriptive geometry is the subject that the laying off is founded on, to find the shape of each timber in the ship from the drawings that are sent from the Admiralty. Dr. Woolley thought a great deal of the subject, and in fact it is his book we are taught the subject from, and which we use principally.

1814. (*Chairman.*) In fact, I suppose it teaches you how to realise solid forms from flat drawings?—Yes, of course it is entirely by pencil and compasses that we do it. It is not at all analytical, it is done by fixed rules.

1815. (*Mr. Lingen.*) How many of your class are there in the college?—Nine.

1816. That is three each year?—Yes, we are three years there.

1817. Is the instruction given to each three separately, or are the whole nine grouped for instruction?—To each three separately, because the subjects are advancing, and it takes three years to go through the work.

1818. And from the circumstances that you came in by competition, the three, I suppose, are pretty well abreast, that is to say, they have practically all made the same advance in their studies when they join the college, so that there is no difficulty from their being at different stages of advancement?—No, generally the three that come up together are very nearly alike, but very often there is a difference between years. One year they may be very much better than they will be the next year.

1819. But there is no difficulty arising in your class, such as arises in some larger classes, that the men who are admitted at the same time, and who have to be taught together, are of very different attainments, because practically in your class they are of the same attainments, and the three who came in together, can be grouped together for instruction?—Yes, very well, I should think.

1820. (*The Rev. H. A. Morgan.*) How long were you under Professor Miller?—For three years.

1821. Were you under him when you first came?—Yes.

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Esq.

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1823. How high in mathematics did you read?—We go through a very extended course.

1824. Did you reach partial differential equations?—Yes, and solid geometry.

1825. The higher parts of solid geometry?—We read through Aldis, and Professor Miller gave us a great deal from Salmon, although we did not have the book supplied to us.

1826. In fact, it required a first rate mathematician to lecture to the class you attended?—Yes.

1827. From what you have seen subsequently, do you think it desirable that the class which you were in should go through so high a course of mathematics?—Yes, I think so. In some of our work on the stability and oscillations of ships, we have to do with very difficult equations and the highest mathematics are required.

1828. (*Mr. Lingen.*) In the Constructor's Department you find that all your studies at the college stand you in stead, and that a less extended course of mathematics would not have made you so competent for the practical duties that you have to perform in that department as the course which you went through?—I think not. There is always this, that while there are three of us go up to the college every year, there is not more than one in a dozen will ever come up to the Admiralty. The others will be officers in dockyards, and there, their mathematics will not be of so much use to them.

1829. But they may come back again, may they not, from the dockyards to the Constructor's Department?—Yes, there is always a chance when there is a vacancy on the establishment here of course, as it is open to all of those at the dockyards as well as to those who are supernumerary here.

1830. But even in the dockyards, in receiving the instructions and drawings from the Constructor's Department at the Admiralty, there must be great room for a man's mathematics in the practical application and adaptation of materials to realise all those conditions?—Yes, there certainly is; of course the strength of materials and such things as that are brought in in building ships.

1831. But from the very fact that it would be requisite to follow precisely instructions that turned upon very delicate calculations, a man that had mathematical knowledge would be able, would he not, to do that with much greater certainty than a man who had not that knowledge?—Certainly, I should think.

1832. (*Major Donnelly.*) Do the dockyard apprentices and the engineer student work together, for instance, in the descriptive geometry course that you have spoken of; do they all go through it together?—Yes, we work with the engineers, all the mornings we are at college, and the afternoons we are in different rooms on our professional studies.

1833. Descriptive geometry is found rather a difficult study for a great number of students, is it not?—It is not a very difficult subject, but to engineers it is not so useful, and they may not care about spending so much time about it.

1834. Did you think there was sufficient assistance given them in learning it?—I always found quite enough, and I never heard any complaints.

1835. There was sufficient time devoted to the individual assistance of students who found difficulties?—Yes, I should think so. It is usually in this way. In the afternoons, from 2 to 5, we are at it. From 2 to 3 the lecturer goes through perhaps two propositions on the black board in the lecture-room, and then for the other two hours they go back into their classrooms, and each student has a table, and he works the problems out practically, and the professor walks round and helps all those who cannot get on with it.

1836. Then there is sufficient assistance, you think?—Yes, I should think so if you could depend upon the number of the class, which varies very much at times. The first year I was there there were 50 in the second division. That would be those who were learning

descriptive geometry, but in the second year there were not more than 25.

1837. Were the whole 50 being taught by one professor?—Yes, at one time. But then a great number of that 50, I should think pretty well 20, would hardly want any instruction at all, they would be so well up in the subject before they come to the college.

1838. (*Mr. Lingen.*) That would appear to show a certain want of classification. The more advanced would have got on better, would they not, if they had been with persons of their own attainments?—It was rather a peculiar case that I speak of there, because it was when the college first opened and there were several different entries into the dockyards, who were allowed to try at once. Students whose time varied as much as two years over one another came up together.

1839. That is not the state of things at present, is it?—No, and it will not be, I expect, while the college goes on as it is.

1840. (*Major Donnelly.*) Did they not offer marks for descriptive geometry in the engineering course?—I think they did not the first year.

1841. (*The Rev. H. A. Morgan.*) Did any of the students in your class have private tutors?—I think not. I have never heard of them having any.

1842. I suppose there are not many private tutors at Greenwich who could teach the subjects which your class read?—I have never heard of any at all.

1843. (*Mr. Lingen.*) Do you and the engineer students form the same classes or are you quite separate?—We work with the engineer students.

1844. Except in certain subjects, I suppose?—Except in subjects that are professional. They design an engine, while we design a ship. They are taught engine drawing, while we are being taught the laying off of a ship and ship drawing.

1845. The architects and the engineers at the college, except that they are in the same building form quite a different part of it from the executive officers department do they not?—Yes, we form the junior mess.

1846. But so far as the instruction goes, it is quite a different part of the college. You do not go to the same lecture as the executive officers, do you?—The only lectures that we take in common with the executive officers, would be those in physics and chemistry, and a few general lectures like those. Mr. Baskcombe and Mr. White gave usually a course of about eight lectures each session on ship building, &c. and some of the executive officers attend them, and someone generally lectures on engineering, about the same number of lectures, and a number of executive officers attend those.

1847. What is the object of your going as an architect to the chemical lectures; is it the action of the sea on metal, or of one metal on another, and so on?—That would be of use to us. Within the last twelve months one of the students who went through the course of naval architecture has been appointed assistant chemist at Portsmouth.

1848. (*The Rev. H. A. Morgan.*) Did you attend Professor Cotterill's lectures also?—Yes.

1849. How many were there in the class who attended Professor Cotterill?—In the first year there would be between 30 and 40 generally, but after the first year there would only be five, varying according to the number of private students that happened to be there. There would be three of us naval architects, two engineers, and the private students that happened to come that year and the foreign students.

1850. Did you find that you received as much instruction as you required in that class also?—Yes, we went through a very thorough course of applied mechanics under Mr. Cotterill.

1851. (*Mr. Lingen.*) Your men do not go to sea at all, do they?—No, not as a rule. Since I have left the college none of them have been to sea. One went with the "Devastation" when she went on her first

trial trip. In such cases as that, where any peculiar ship comes out, they might be put on board.

1852. Are you put on board by the Admiralty as a special sort of inspector or observer as to how the ship behaves?—Yes; under the order in council by which we came to Greenwich there was one clause which said that we should have one twelvemonth at sea

after leaving the college, but it never came to anything.

1853. (*Major Donnelly.*) That used to be the case, did it not?—I do not think it has ever been done: I do not think that any students have ever been to sea either from this school or from any of the preceding schools of naval architecture.

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Esq.*

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The witness withdrew.

Adjourned.

At the Royal Naval College, Saturday, 16th December 1876.

PRESENT :

THE REVEREND O. GORDON, B.D., IN THE CHAIR.

The REVEREND H. A. MORGAN, M.A.

C. D. LOVELESS, Esq., Secretary.

Lieutenant CHEVALLIER, R.N., examined.

1854. (*Chairman.*) You are a gunnery lieutenant, are you not?—I am going through the course which will ultimately result in my being a gunnery lieutenant.

1855. Did you go through the course here as a sub-lieutenant, or were you examined here as such?—No; I was here a couple of years ago as a lieutenant.

1856. Where were you examined as a sub-lieutenant?—At Portsmouth.

1857. That was before this college was founded, I presume?—Yes, that was six or seven years ago.

1858. Then you came here as a lieutenant as a voluntary student?—Yes.

1859. For a year?—Yes, that is to say for a session—nine months.

1860. Then you went to service again?—Yes.

1861. When did you come back here?—On the 1st of October this year.

1862. Could you stay a second year here if you liked?—I could have stopped a second year when I was here as a lieutenant.

1863. But you did not?—No; it would have been against my interests.

1864. You went to sea?—Yes, I went to sea for a year.

1865. When you have completed your course as a gunnery lieutenant here, could you come back here if you chose?—No.

1866. You will have finally done with the college then?—Yes, until a period of four years has elapsed, at all events.

1867. Could you come back then if you chose?—Yes, I think so, according to the regulations.

1868. Under whose instruction are you?—Professor Lambert's.

1869. That is in mathematics?—Yes.

1870. What other professors are you under in other subjects?—Captain Needham in fortification and Professor Reinold in physics.

1871. Do you attend any other lectures besides those; for example, in French or German?—No; no others, with the exception of chemistry.

1872. That is under Dr. Debus, I think?—Yes, and perhaps I may say here that we get rather too many lectures.

1873. Do you find that you receive all the assistance from the professors and the instructors that you think necessary?—Yes, except that one is so very rarely in the study during the week that one practically does not get much assistance. The first division of the class are lectured to from 9 till about 20 minutes to 12 in the morning in mathematics.

1874. When you say you are lectured to, do you mean that you are at work at mathematics, or that there is actually a lecture going on all the time?—I mean that we are making notes from a lecture. Professor Lambert is lecturing to us in mathematics, and we are taking notes during all that time, except for about five minutes in the middle, when we go out for a breath of fresh air.

1875. You are not working examples, but actually taking notes during that time?—Yes.

1876. Does he work on the black board?—Yes. During the last hour, from about 20 minutes or a quarter to 12, we are either at physics or at chemistry, except on Wednesday, when we have the last hour for work in the study.

1877. Are you working in the study in the afternoons?—On Monday we work in the study at mathematics. On Tuesday we have a lecture on fortification; that makes four hours' lecture for the day—the rest of the time is taken up with fortification on Tuesday. Then Wednesday afternoon is a half holiday during the winter months. Thursday afternoon is devoted to fortification again with us. On Friday afternoon we work in the study. So that we only get two afternoons for work in the study.

1878. Therefore, if there is anything that you want, it is not more instruction, it is more time?—Yes, we want more time. As far as the question of time goes, as a matter of fact all the men who are going in for gunnery are obliged to work extremely hard. I can say for myself, and I think for everybody else also, that we never get to bed before 12 o'clock at night.

1879. I think you have no regular instruction in the evenings, have you?—No, but then we have to work out those examples. It is impossible practically to do all that one ought to do in order to keep up in each subject.

1880. I suppose the instructors do occasionally give you a little friendly assistance in the evening?—Yes, Professor Lambert sometimes does, but that is entirely a voluntary thing on his part.

1881. Should you feel that you could go to their rooms or their houses freely if you wanted assistance, and ask for it in a private way?—I do not think it is done.

1882. But sometimes Professor Lambert comes and sees how you are going on, and gives you help?—Yes, he generally comes in once a week in the evening.

1883. What mathematical knowledge had you when you came here; did you know any co-ordinate geometry?—Yes, I knew a little about the straight line, but very little about curves of the second degree.

*Lieutenant
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1884. Have you begun the differential calculus yet?

—Yes, I have just begun it.

1885. You have only been here a very short time?

—Yes.

1886. I suppose you have some idea of what you have to do during the session; do you think you will be able to compass it?—I shall be able to get through. I have no doubt I shall pass all right, but as far as getting a first class goes, I think it is very doubtful whether I shall be able to manage that.

1887. (*Rev. H. A. Morgan.*) Do you find that your health suffers from the amount of work you have to undergo?—No, I have not found it so.

1888. Have you heard others complaining that their health has suffered from the amount of work they have to do?—I have heard of men saying sometimes that they do not find themselves well here, but I do not know of anyone who has actually suffered much.

1889. Have any of the students in your class a private tutor?—No, I think not.

1890. None at all?—No.

1891. Can you thoroughly digest all the instruction that you receive in these long lectures?—I cannot at present. I may be able hereafter to consolidate it.

1892. As far as you yourself are concerned, you would prefer to have a shorter course of instruction in the way of lectures, and more time for private study?—Yes.

1893. You cannot, I suppose, give more time to private work, preparing for lectures and working examples in your own rooms and so on, than you do at the present time?—No. For one thing, a great part of our time is taken up in making a fair copy of the notes we have taken during the lectures.

1894. Do you think it would be desirable to lengthen the course or courses of instruction here?—I think so. If we are expected to learn thoroughly the subjects we are now learning, we ought to have more time to learn them in.

1895. How many subjects are you expected to learn in the time you are here. Will you go through them?—Algebra, first of all.

1896. How high do you go in algebra?—We read up to the exponential theorem inclusive.

1897. The theory of numbers?—No.

1898. Probabilities?—No.

1899. You read logarithms thoroughly, I suppose?—Yes.

1900. Logarithmic series?—Yes.

1901. How high do you go in trigonometry?—I do not quite know how high we go in that subject, but I know we do De Moivre's theorem, and its applications.

1902. Series?—I think so; I do not know.

1903. What other subjects?—Co-ordinate geometry only to equations of the second degree.

1904. Including the general equation of the second degree?—Yes, and then applying it to all curves.

1905. Differential and integral calculus?—Yes, differential and integral calculus; the principles and the application of them.

1906. How high do you go in differential calculus; do you go, for instance, to the change of independent variable?—I cannot answer that as yet.

1907. In statics how far do you go?—I do not know how far we go, but we have to do statics.

1908. What text-book is used?—Todhunter's small text-book, I think; I am not quite sure, however, that that is the text-book used now; it was used when I was here before. Practically, in Professor Lambert's class, we construct our own text-books from lecture notes.

1909. Dynamics?—We have to do that, working in the two branches, and hydrostatics.

1910. The theory of equations?—You mean in the higher part of algebra? We have only just touched upon that. We have done the theory of quadratic equations.

1911. You have only nine months to learn all these subjects in?—Yes, and there are several more to be learnt also.

1912. In addition to attending lectures on steam, on chemistry, and so on?—We need not attend lectures on steam; we are not expected to attend those outside lectures.

1913. Does that apply to chemistry too?—We are recommended to attend lectures on chemistry up to Christmas, because of its application to the action that goes on in galvanic batteries.

1914. I suppose the great majority of the men in your class have come to the college in the first instance with only such an amount of mathematical knowledge as they had acquired in the "Britannia"?—Yes; of course a great many had a course in the old college, and in a few years' time they will all have passed through here as sub-lieutenants, but at present very few have done so.

1915. Their knowledge in the "Britannia" is revised and made more thorough?—Yes.

1916. There appears to be a great deal to do in the nine months for a man of ordinary ability?—Yes, and to many men many of the subjects are completely new—fortification, for instance.

1917. And the differential and integral calculus would be quite new to some?—Yes. To the majority of the men co-ordinate geometry is quite new. But I should say that the differential and integral calculus is not necessary for passing; it is only necessary for a first class. There is one more subject which I think I did not mention before, physics in several branches.

1918. Professor Lambert in his lectures, I suppose, explains the most important propositions in the subject as he goes along?—Yes. There is one thing that makes his lectures longer than they otherwise would be—namely, that he goes into detail and anticipates questions which might be asked afterwards.

The witness withdrew.

Lieutenant A. examined.

Lieutenant
A., R.N.

1919. (*Chairman.*) You are a lieutenant here for voluntary study?—Yes.

1920. How long have you been here?—I came on the 2nd of October this term, and I was here for two months last term.

1921. You may enter, I suppose, at any time of the year?—No, not exactly. I entered in April last, and stayed the remainder of that session; then the vacation came, and afterwards I came back again and got re-appointed.

1922. And now you will be here altogether nine months unless something takes you away?—Yes, unless I get an appointment.

1923. Might you stay another session if you chose?—No, I believe not; it is not open to me to stop another session.

1924. I had understood that permission might be given to stay another session to any one who was making very great advance in his studies?—That has never been done after a whole session; two whole sessions have never been passed here by the same man.

1925. What are you studying now; mathematics, of course?—Yes, I have gone in for mathematics principally.

1926. You are obliged to go in for mathematics, are you not?—Yes; I take rather an interest in mathematics myself.

1927. No other course of lectures is necessary, I think?—Physics and chemistry are not exactly necessary, but Dr. Hirst makes a special point of recommending you to attend those lectures. That is a

very difficult subject, involving a considerable amount of reading to do it thoroughly; but I attend the lectures.

1928. Suppose you had any particular taste, such as geology for instance, although there are no geological lectures here, still if it were known that you were a student of geology, you would not be discouraged from pursuing that study if you could, would you?—No, but there are no lectures here upon that subject.

1929. You are very near London, and you would be allowed to pursue that subject if you chose?—Yes, you might study it privately if permission was granted to be absent from other studies.

1930. You say you are fond of mathematics?—Yes, I like mathematics, certainly.

1931. What knowledge of mathematics had you when you came here?—Very little, because I had not learnt any in the last four years.

1932. You knew some algebra?—Yes, but I had learnt none for three years fully.

1933. What are you doing now?—Principally mathematics; but lately I have taken up drawing and French, and attend the lectures on physics, chemistry, and steam.

1934. It is with Mr. Laughton that you read mathematics?—Yes.

1935. How many are there in the class?—I think the number is between 30 and 40; I think it must be 40; I am not quite sure.

1936. Are the students generally regular in their attendance?—Yes, they are pretty regular, generally speaking. Of course a man goes out for half-an-hour sometimes, because it is impossible always to stop throughout the three hours.

1937. Still you would say that the attendance is regular?—Yes.

1938. Do you think that they are generally industrious?—Yes, I think so.

1939. Do they generally like the place?—It is not so popular this term as it was last.

1940. What is the reason of that; is the discipline more strict?—No, it is not more strict at all, but the college is not so popular, I know, and there are not so many men here this term as there were last. The number in the mess-room is not as great by 50 or 60, and the number of sub-lieutenants cannot have diminished; so the diminution must be in the half-pay officers.

1941. Do you think on the whole that the voluntary students here are a studious class?—Yes, I think so, with one or two exceptions. They would not come here unless they were inclined that way.

1942. Perhaps they might come here and find the work a little too hard and the discipline a little too strict. Do you think that that ever happens?—I do. I think a great many leave on that account. Two or three months ago some left, and in a few months I think more will leave for that reason.

1943. They find that it is not so pleasant a place as they anticipated?—No; and also they are not allowed to take up the subjects they particularly wish to go in for; they are not left alone enough.

1944. Have you ever known any instance of any of those voluntary students being dismissed the college for idleness or any other cause?—I have known two or three dismissed, but not without a cause which I thought was perfectly sufficient.

1945. Do you think that if it was known to the authorities here that a man was, I will not say spending his time viciously or doing anything ungentlemanly, but not trying to improve himself, he would be sent away?—I think most likely he would; but it might not get to the knowledge of the authorities that he was improving in one particular subject; they might not know anything about that. A man might not be going on with mathematics or chemistry or physics, but he might be working at something

else. Some men come here with a desire to improve their drawing or their French, and it might be that a man might be hardly treated in that way because he might be improving in one subject privately, and the authorities might not know anything about it.

1946. I have no doubt you are a very industrious student, and there are others of the same kind?—I find that I cannot do more than an hour and a half at a time without a break.

1947. Do you find that you receive all the assistance you require from the instructors here?—Yes.

1948. You have no private tutor?—No; I am with Mr. Laughton and Mr. Solomon.

1949. Mr. Solomon is the assistant to Mr. Laughton?—Yes.

1950. And you find that they give you all the assistance you want?—Yes.

1951. They have the time to do it; the class is not too numerous for them?—No, I do not think the class is too numerous. I think perhaps they try to cram us a little too much. They go rather too fast for most of the men. I stand pretty well; I am tolerably near the top; I generally come out fifth or sixth in the examinations.

1952. You have an examination every fortnight, I believe?—About once a fortnight, and I am pretty well up in the examinations, but I know that a great many men complain that Mr. Laughton sometimes goes ahead too fast, because, like myself, they have not learnt anything for three years before coming here, and some even for a longer time.

1953. Do not you think it would be better if there was another instructor to take the more backward students?—No, I do not think that, because Mr. Solomon takes the backward ones, and he gets them on very well.

1954. Your opinion is that, generally speaking, the voluntary students here are really anxious to improve themselves?—Yes, I think so. If they did not desire to improve themselves, they would not come.

1955. You do not think that any of them come here with the idea that it is a pleasant place near London, where it is not necessary to do much?—No; I think a man comes here with a view of getting an appointment afterwards, and making himself known.

1956. It may perhaps be that some like better living in the neighbourhood of London, where there is society, and where they are within the range of amusements, than with their friends in some remote part of the country, where there is no amusement obtainable; do you think that that is the case with any of them?—I think most of them look at it from a service point of view. They come here because they think it will be a good thing for them in their profession.

1958. You will have to go through a final examination, will you not?—Yes, at the end of the term.

1959. When will that come?—In June.

1960. Then you will have been here a little more than a session?—Yes.

1961. If you pass that you will have some mark opposite your name?—If one gets a certain proportion of marks out of the total, they put a G. opposite your name.

1962. That means "Greenwich"?—Yes.

1963. And I suppose as regards your future in the navy, it is an advantage to have that letter attached to your name?—It is very common now; still it is an advantage; it shows that you have not wasted your time.

1964. At all events it would be a disadvantage if it was not there, I suppose?—Yes, I suppose it would after being here a whole session.

1965. (*Rev. H. A. Morgan.*) With regard to what you have said respecting the tone of the instructors,

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A., R.N.*

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do you think that the voluntary students are on the whole quite satisfied with the instruction they receive?—The instruction is good enough.

1966. Have you enough of it?—Yes; having two instructors in the study, I think that is quite sufficient, because the students are divided into two classes; the one consists of those who are a little more advanced, and the other the backward ones.

1967. Have they any cause for dissatisfaction in any other respects, do you think?—No, I do not think so at all.

1968. To what do you attribute the falling off in the numbers in the college between this term and the last?—I do not think that the men like the place so much as they thought they would when they came.

1969. Have you heard men giving reasons which bear at all upon this point?—Yes, the reasons are these,—that they consider they are looked after too much, I think.

1970. Treated too much like boys?—Yes; there is too much surveillance by the police, for instance. The police have a great deal of authority here, and they do a great deal of mischief, running men in very freely.

1971. Do you mean the metropolitan police?—No, the police in the college. For instance, they come up at nights and look about the doors and see about the lights being out. That annoys men. Of course the lights ought to be out, and if a man's lights are not out he must take the consequences; still there is no occasion for a policeman to come about the door of your room, and so on.

1972. Does Dr. Hirst occasionally visit your study?—Yes, he comes up now and then.

1973. Were you on board the "Britannia"?—Yes.

1974. Then you were at sea, I suppose, for several years after leaving the "Britannia," and before coming to the college?—Yes.

1975. Had you a naval instructor while you were at sea?—Yes, in every ship I was in.

1976. Did you make much progress there?—Yes, I made considerable progress in nautical astronomy and navigation.

1977. Did you learn mathematics; algebra, trigonometry, and so on?—Not so much as I could wish. Since I have come back to the college I have learnt a great deal of mathematics, which I ought to have known when I came here.

1978. Were you in small ships or large ones?—I was in a corvette; that was the smallest.

1979. Could you attend to mathematics there so as to make a fair progress in them, and at the same time attend to your duties in the ship?—Yes; there was a very fair opportunity given by the captain in every ship that I served in. He gave an opportunity to the midshipmen to study; he gave up a cabin, and there were two or three hours allowed every day.

1980. You were rather fortunate, because it is frequently the case in small ships, that the midshipmen do not receive instruction, and find few opportunities for study?—In the last ship I was in there were two midshipmen who received very little instruction, for there was no instructor on board.

1981. (*Chairman.*) How many midshipmen were there on board that ship?—Two, but there was no instructor.

The witness withdrew.

Lieutenant B examined.

Lieutenant
B., R.N.

1996. (*Chairman.*) You are a voluntary student here?—I am.

1997. How long have you been here?—Since October this term, and for two months last term.

1998. You will continue here, I suppose, until next summer's examination, that is in June or July?—Yes.

1982. When you had an instructor on board, how many midshipmen had you on board?—In the corvette "Scylla" there were eight.

1983. Had you any examinations to pass while you were a midshipman on board?—The system has been changed since I was a midshipman. Now there is an examination every six months. I had what they called the intermediate examination at the end of three and a half years, and that was the only one I had between leaving the "Britannia" and coming here.

1984. I suppose the "Britannia" was not at Dartmouth when you passed out of it, was it?—Yes, it was at Dartmouth all the time.

1985. Were you there two years?—No, I was there for a year and a half.

1986. Should you have liked to have had a longer course there?—No, I certainly should not. I was very glad to leave it.

1987. Do you think that a longer course, say a three years' course, in a naval college on shore, with two cruises of three months in each of the last two years, would be a good thing?—I think myself that a ship is the best place for the cadets to receive their instruction in. I hold that opinion for various reasons.

1988. By a ship I suppose you mean a ship in service, not such a ship as the "Trafalgar," which was almost a floating school; it had 80 cadets on board?—No, I mean in preference to a college; I think a ship is a better place.

1989. (*The Rev. H. A. Morgan.*) Have any of the voluntary students private tutors here?—No, I do not think so,—not that I know of.

1990. In your class-room is silence maintained now fairly well, so that you can work properly?—Yes. I think myself it is very orderly, more so than my room, when I was here as a sub-lieutenant, used to be.

1991. That was not perfectly orderly?—No, not so orderly as my present room, by any means.

1992. Do you know whether it is the case that the rooms where the sub-lieutenants study are not quite as orderly as they should be?—I take it that it must be very hard for a man to keep order among the sub-lieutenants, because they are more inclined to be noisy than the voluntary students. We come here as voluntary students, and if we choose to work there are opportunities given to us of working, but it is compulsory on the sub-lieutenants, and they look upon it in a different way.

1993. And they are younger also?—Yes. When I was here as a sub-lieutenant, there was only one instructor for a great number of sub-lieutenants,—I think as many as 80, but it has been altered since, and there are now three instructors for them.

1994. Are the students in your class fairly regular in their attendance at lectures?—Yes, but they cannot be expected to keep at it for three hours at a stretch. I know I cannot. I come in at nine, and then I find I am obliged to go out for a quarter of an hour about a quarter or half past ten, and I come in again for an hour, and so on. I cannot keep it up without going out, but I call that being pretty regular.

1995. You find your head clearer for going out for a short time?—Yes. I cannot stick at it longer than that; that is just the fact.

1999. So that, in reality, you will have the advantage of being more than one session here, a session and a bit over?—Yes.

2000. Are you studying mathematics?—Yes.

2001. That is the only course of study which you are necessarily bound to attend, is it not?—We are bound to attend mathematics in the forenoon, whatever else we do.

2002. Your other subjects are voluntary?—Yes.

2003. You are not bound to take up or to study a certain number of other subjects?—No, we are not bound to take up anything except mathematics.

2004. Did you know much mathematics when you came here?—No, I knew very little. I only knew the usual amount that was learnt at the old college.

2005. Were you on board the "Britannia"?—Yes.

2006. When did you pass out of it?—In the beginning of 1866.

2007. Did you know as much mathematics when you came here as you did when you left the "Britannia"?—Yes; I knew more, because I went to the old college. I was attached to that for some time.

2008. At Portsmouth?—Yes.

2009. While you were at sea, had you a naval instructor on board with you?—Yes, part of the time, but I did very little work.

2010. Was that because you had no time for it?—In one ship I was in the midshipmen never did any.

2011. It was not the rule of the ship?—No, it was not the practice.

2012. What are you doing now in mathematics?—I am doing conic sections and trigonometry.

2013. You have not got into the differential calculus?—I am just commencing it.

2014. Are you under Professor Lambert?—I am.

2015. You find that Professor Lambert goes on quite as fast as you can follow him, I suppose, or do you keep well abreast with him?—It is a very great strain to keep up with him.

2016. Do you get all the individual assistance from him that you can reasonably expect?—Yes, everything. Of course, if you take up extra subjects, you do not get so much time in the class-room when he is there as you otherwise would, but that is your own choice, of course. If you give up attempting extra subjects, you have your time when he is there.

2017. Do you think that the voluntary students here are generally speaking an industrious class?—I think that they are industrious on the whole. Of course, there is a certain number of them who are not, but a great many of those who are not industrious at mathematics follow two or three other subjects perhaps, and give their attention to other subjects besides mathematics.

2018. Is any notice taken of irregularity at lectures?—Yes. Those who are irregular in coming in to the study are noted every day.

2019. But are those who are extremely irregular reprimanded or warned in any way?—Yes; I cannot be certain what notice is taken of it, because I have not been brought up myself; but I know that the names are taken of those who are not in, and I believe that if they were away a certain number of times the admiral would send for them.

2020. And if that irregularity continued and went on to excess, I suppose they would be desired to leave the college?—Yes.

2021. Have you ever known any case of a man being sent away?—Yes, there were one or two.

2022. Simply for idleness and inattention?—Yes.

2023. Not for anything discreditable to them as officers and gentlemen, but simply because they were doing no good here?—Yes.

2024. There are not so many of your class here this year as there were last, I think?—I think not.

2025. Is that because the life here is not liked, or because they do not think it will bring them any real advantage in the service?—I do not think it is that the college is not liked. I think it simply happens that there are not so many; perhaps there are not so many who feel inclined to come, or it may be that more have gone in for gunnery. I do not think it is that the college is disliked; the discipline is certainly stricter than it used to be.

2026. You do not think that any officers come here simply because they have an idea of its being a pleasant place of residence, and then go or wish to go away because they find that there is more work to be done than they expected?—I think that may be the case with some.

2027. They think it is a sort of club before they come?—I do not think there are many who do that.

2028. There are men who might prefer a residence within half-an-hour of town to living with their friends in some remote part of the country; that might perhaps induce some men to come here, and, if that is the case, they would naturally be disappointed if they found they had a good deal to do?—Yes, if they came with that idea.

2029. (*Rev. H. A. Morgan.*) Are the voluntary students generally satisfied with the instruction they receive in the college?—Yes, I think so. I think there is a sort of feeling amongst them, or some of them, that they are pushed rather too fast or too hard; it is simply that they cannot quite keep up with the work.

2030. Do you think it would be better if the course of instruction were lengthened?—Yes.

2031. There is too much to be done in the time at present?—Yes; for instance, take Professor Lambert's class; I think most of those who are in our class at any rate like the work, but they find that they have not time to do it thoroughly.

2032. They enjoy the instruction they receive from Professor Lambert, do they not?—Yes, I think so.

2033. And they would wish that they had more time to enable them to acquire a more thorough knowledge of mathematics?—Yes.

2034. Do you think that there is any cause for dissatisfaction among the voluntary students in the college?—I do not think there is any.

2035. Is the discipline too strict?—Certainly not at all.

2036. (*Chairman.*) You do not think that it would be an advantage if you had an extra teacher in mathematics?—No. I do not see that it would at all. We have got another man to refer to in the study. Certainly there is at times a great run after him, and you have to wait occasionally, but otherwise I do not see that further assistance is required.

2037. If you are stopped at a particular point in a mathematical process, you are stopped absolutely. If you come to a difficult passage in learning a language you can pass over the sentence and go on to the next, but you cannot do that in mathematics; you must have the assistance at the time you want it, otherwise your time is wasted?—Yes.

The witness withdrew.

T. S. OBORN, Esq., R.N., further examined.

2038. (*Chairman.*) Our attention has been a good deal drawn to the subject of private tuition here, and we wanted to know whether you were aware of the extent to which it is carried. We know that you "dislike" it?—Yes, most certainly, I dislike it very much.

2039. Therefore we should expect that you discouraged it as far as you could?—I do.

2040. Are you aware of the extent to which men resort to it?—I could not answer definitely as to the

number, but I know that it is fashionable, if I may use the expression, to a very great extent indeed, and I think it is resorted to far more than is necessary.

2041. Are you aware that at least 50 per cent. of the men have recourse to it?—I am not at all surprised to hear it. I think I should have given that proportion myself.

2042. Are you aware that it is not only the idle and the backward students, but some of the best who resort to it most?—I know that some of the good

Lieutenant B.
R.N.

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T. S. Oborn,
Esq., R.N.

*T. S. Oborn,
Esq., R.N.*
16th Dec. 1876.

men have resorted to it, but not many of them, I think. A great many of the hard-working men have made it their boast to me, "I have done better than so and so, who has spent so much money in private tuition."

2043. You know Lieutenant Burney, of course?—Yes.

2044. Were you aware that he had private tutors?—He had private tuition, I think, owing to his father's position. It was a sort of accidental thing with him.

2045. Do you think that he would have come out in the first class without the assistance of private tuition?—Yes, I do.

2046. Do you think he would have got the Beaufort prize without a private tutor?—The Beaufort prize for this year has not yet been awarded. I have no reason to think otherwise; some men who have got the Beaufort have not had private tuition, and Lieutenant Burney certainly was better than some who have got the Beaufort: he did very badly at his examination, and I was dissatisfied with him; his measure certainly exceeds that of some men who have obtained the Beaufort; his book-work knowledge was very good.

2047. The acting sub-lieutenants who enter at the same time are kept together and instructed together during the whole of their course, are they not?—Yes.

2048. In every subject?—In every subject.

2049. Do you think that that is a good system?—I have thought a good deal about it and considered for a year or two whatever we did as tentative, but I think it is the best that can be adopted for them. Dr. Hirst and I have talked over the matter often. At first I proposed to Dr. Hirst that the really good men should attend some of Professor Lambert's lectures. He said, "No. I do not think that would be wise." I think he did what was very judicious, because I find that I can keep the best men going in my lectures and the most inferior men at the same time. I do not mean to say that the lecture might not be pitched too high for the inferior men, and even too low for the better men, but I can satisfy all with the work upon the lecture afterwards and make up to the superior men as well as to the inferior. They are all perfectly supplied with the lectures, and I find that I can attach to every day its allotted work. If a man miss a lecture he has missed a great deal, and what cannot be easily made up by me; he can only make it up by another man's notes, and coming to me afterwards for assistance. I find that if I miss a man for a single day, the effect is perceptible.

2050. In point of fact, you do not attempt to classify the men who enter at the same time?—I classify them as their teacher. I may give a certain set of examples which I expect all to do, on principle simply, but the examples which I set to the superior men are very different from the examples that I set to the inferior men; still they are on the same lecture.

2051. You adapt your instruction to them, but you do not classify them?—I certainly adapt my instruction to them; in fact, I almost individualise them in my treatment of them, so much so, that in the black-board work, in the course of a few days, I know them sufficiently well to call up six or seven or more, and give another kind of instruction altogether to them from what I give to another set.

2052. Would it be a greater convenience to you as an instructor, if instead of coming up every month as they do now, they came up every three months, so that you had a larger number to deal with, in which case you might classify them. It would be a difficult thing to classify four or five men, but if you had twenty or thirty coming together you might classify them with a view to adapting your instruction to them?—That would be better, but I may tell you this, that the Admiralty would not hear of it. Since you examined me, I have had a conversation with Admiral Hornby accidentally, and he told me that the present strain upon the service was almost

more than the Admiralty could endure, unless shortly they saw that they got compensation for it in an educational point of view. Therefore anything which would stop the supply to them of executive officers ready for employment, would not be thought of for a moment.

2053. Looking at the knowledge of the men who come up to you, should you say that the half-yearly examinations on board ships are of much value?—I expect a great deal from them; they ought to be of value. If they are properly carried out, most certainly they ought to be of very great value, but if they are carelessly carried out, they are useless.

2054. Does not the practical value of an examination depend very much upon the result being made known as soon as possible afterwards?—Of course it does.

2055. But in this case that is not done; the papers may be sent to the other end of the world, and they have to come back again?—I think that is met in this way now. The papers are revised by the instructor in the Admiral's ship and the numbers made known at once. They are subsequently revised at head quarters, which is necessary, but the result of the revision of the senior officer's naval instructor is known in a short time.

2056. It may be some months before the result is known in many cases?—Yes, it may be months, but seldom; no doubt it would be better that the result should be known immediately.

2057. Do the naval instructors on board ships have examinations themselves?—So much depends upon the man himself and upon the captain, that little may be done, or much.

2058. To send a uniform set of papers all over the world to youths whose circumstances are very different, some of whom may be under able instructors, while others may be in small ships where they have no instruction whatever, or no time for study, does not seem to me to be a very fair way of testing their progress?—They start from the "Britannia" together; we may say that they start equal, and thus to a certain extent it may be a fair test; perhaps it is not as good as one could wish, but as good as can be attained under the circumstances. I doubt whether you could substitute anything better for it.

2059. Supposing the naval instructors themselves examined in subjects which they knew the junior officers had received instruction in, we will say, during the last three months, and made a report to the captain, and the captain made a report to the Admiralty, do you not think that that would be a better system?—Emphatically, no. I think I know the service well, and naval men.

2060. By the "men" do you mean the naval instructors or the captains?—The officers generally.

2061. What I was thinking of was that if the youths come here in such a state of ignorance as you describe, the intermediate instruction they get after they leave the "Britannia," and the examinations altogether, cannot be of much use; it does not enable them to keep up what they knew when they went to sea?—I am afraid that must be the inference.

2062. (*Rev. H. M. Morgan.*) Have you any difficulty in maintaining proper discipline in your class room?—On the contrary, the students are tractable to a degree; my surprise is that they so implicitly follow my directions and accept everything I state.

2063. Do you think that any of the other instructors who have the management of classes attended by the sub-lieutenants have any difficulty in that respect?—I have heard reports.

2064. Have you heard reports that there is so much noise occasionally that it is impossible for the more industrious to pursue their studies?—I have, but not such that I could notice officially to report.

2065. If you were to leave your class of students alone, do you apprehend that there would be any noise or disturbance in the class?—Yes, with some classes.

2066. Have you ever observed any sub-lieutenants unfit for severe study owing to any partial excess?—Yes, many

2067. Have you reprimanded them for it or spoken to them at all?—I have advised them on the subject, and shown them that I had noticed it.

2068. In such a case as that would you not report them to the Admiral?—Most certainly, without any hesitation, if they were bad enough for it. I have had much experience of sub-lieutenants. I do tell the Admiral always and the director of studies when I notice anything of the kind, but the cases are of such a character that one cannot take hold of them to report on a definite charge; they are so general that it is not easy to find a special fault for report. I may observe that those sub-lieutenants are nearly all amongst the failures, although they have often been men of considerable ability.

2069. As to your room, you have no reason to complain of a want of regularity on the part of the sub-lieutenants?—No; on the contrary, I have to speak in the opposite way entirely.

2070. To what do you attribute the falling off of the numbers in the college?—I was not aware that there was any falling off in the numbers.

2071. We have been told that the numbers at present are not so large as they were, especially among the voluntary students?—I was not aware of that; on the contrary, I have known that some men who have made applications have been told that there was not room for them, and that they could not come unless they provided themselves with quarters out-

side, but they might take advantage of the mess, and some have done that. Perhaps I may be allowed to show you a letter which I put in my pocket a day or two ago after I knew that I was to be examined. It only happens to be one letter that I have not destroyed. I must have received thirty or forty like it. I thought it would be only right to let you see such a letter from a young naval officer, because it shows the spirit felt towards this place throughout the service amongst the good men (*showing a letter*).

2072. (*Chairman.*) Do you find the division of the six months into three periods of eight weeks each, during which the students pass from one instructor to another, favourable to their improvement?—I think so at present. I look to being able to shorten the first period for algebra and geometry, so as to be able to give more time to mechanics and nautical astronomy. At present they want fully the first two months for algebra and geometry.

2073. They do not come before you personally until the last eight weeks, do they?—Only in the way of report.

2074. Not for direct instruction?—No.

2075. (*Rev. H. A. Morgan.*) Do you find that they are well grounded in algebra and geometry when they come to you?—Pretty well.

2076. Can they follow you on the black board?—Very well. I adapt my teaching to them. I often have to explain a simple expression, but one who is accustomed to lecturing reads faces, and can see intelligence pass over some faces and not over others.

The witness withdrew.

Admiral EDWARD G. FANSHAWE, C.B., further examined.

2077. (*Chairman.*) Are you aware of the extent to which private tuition is resorted to in the college?—I am aware that it is very frequently resorted to; but I am not aware of the exact extent.

2078. You do not think it necessary to inquire particularly into that question?—No.

2079. You do not think that it could be prevented, or that it would be wise to attempt to prevent it?—No, I think not.

2080. You think that whatever assistance is provided for men here, there will always be some who will have private tutors?—I think there will certainly be some who can barely scrape through, who will resort to private tuition for the purpose of getting all the assistance they can; and there will be others who aim at getting a first class, and who, considering the great advantages which they will obtain by it, will always avail themselves of every possible means of preparing for the examination.

2081. Is the irregularity of voluntary students in their attendance on lectures ever brought before your notice?—Yes, frequently.

2082. Do you think that there is great irregularity in that class?—No, not great irregularity. I think there are frequent irregularities in punctuality of attendance.

2083. Have you ever had any occasion to dismiss any officers for that reason?—I have spoken to them upon the subject, and I have told one or two they had better leave; it would lie with the Admiralty to dismiss them; but if upon my speaking to them they did not leave, I should represent it to the Admiralty.

2084. Do you think any of that class of students come here simply with a view of its being an agreeable place for a temporary residence in a social point of view?—I do not think they come with that view and retain it.

2085. You think it is not so?—I think not. It is a difficult line to draw with voluntary students; but I do not think there are any who remain here using the place in the manner you describe.

2086. You have never heard it spoken of as a club?—Not within the college.

2087. Outside?—I have heard the expression applied to it.

2088. Perhaps that is a view taken of it by those who do not really know what is done here, or what is required from the students?—Precisely. In order to show you the way in which notice is taken of irregularity in attendance, I will lay before you three letters. A few days ago I observed that three officers had been absent on a particular day, and I wrote a memorandum to them, which you will see here (*pointing to a paper*). I have here the answers to that memorandum (*producing three letters*). The reason I showed you that letter last is to explain that, it not being satisfactory, I sent for the officer and showed him that he had been absent several times; in fact, he had been absent during the whole of the forenoon seven times.

2089. Not in one week?—No, during the whole session. I spoke to him about it, and he undertook that it should not happen again. That was the way in which the irregularity was dealt with. Since then I have observed that another officer was absent a great many times during the week. I sent for him and spoke to him. He said he had private business in town. I told him that he would have to go if he did not attend more regularly: I warned him. These are cases of officers I have spoken to myself this session. That was the last case. That shows the manner in which I have dealt with them.

2090. As regards the acting sub-lieutenants, has it ever happened that reports have been made to you of their disorderly conduct in the rooms, of their being noisy?—I have only once had a special report made to me. But I consider it of the greatest importance that the instructors should be capable of exercising such influence over the sub-lieutenants as should repress disorder in their study rooms.

2091. (*Rev. H. A. Morgan.*) Who instructs the sub-lieutenants when they first come to the college?—A Naval Instructor attached to the College.

2092. It is of the utmost importance that they should be lectured to by a gentleman who is capable of giving them a proper starting?—Yes, I think it of the utmost importance.

T. S. Oborn,
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Admiral E. G.
Fanshawe,
C.B.

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2094. Have you any reason to suppose that in any of the lecture rooms superintended by any of the instructors there is a want of proper discipline?—There has never been to my knowledge a case since the college was founded until a fortnight ago, when an officer was reported. It was an officer who had otherwise not conducted himself well, and I immediately forwarded that report to the Admiralty, with a statement as to his general conduct; and they showed a disposition to deal very severely with him.

2095. Has it ever been reported to you that sometimes these young sub-lieutenants come to the lecture rooms evidently having indulged to excess, to such an extent that they are not able to pursue their studies there?—Never.

2096. The instructors would not report that unless they had great reason to believe that it was the case?—I think a good instructor would report it. I have not the least doubt that Mr. Oborn, for instance, would, but not if he heard it vaguely.

2097. In that case he might not report it formally?—I think Mr. Oborn would exercise a sound discretion. I know from Mr. Oborn that he is careful in such matters.

2098. If such a case were reported to you, the consequences would be very serious, I apprehend?—Yes, very serious. I should report it to the Admiralty. There have been very few cases here in which anything like excess has been shown. Those I have reported to the Admiralty, and in consequence of my reports I had orders from the Admiralty to report to them the best means of checking anything of the sort, should it occur; and I told them that I had made arrangements that every Monday morning the captain of the college should inspect the mess books with a view to checking anything like excessive charges of that kind.

2099. We have heard that Dr. Hirst frequently visits the lecture rooms superintended by Professor Lambert and others. Does he often visit the lecture rooms where the sub-lieutenants are?—Dr. Hirst visits all indifferently, not at stated intervals, but he goes into them occasionally.

2100. Do you think it is necessary that he should visit them more frequently, especially the lecture rooms where the sub-lieutenants are?—No, I do not think it is. I have reason to believe that Dr. Hirst has taken more frequent opportunities of visiting a room when he had reason to believe that some deficiency of the strictness might exist.

2101. (*Chairman.*) Do you consider that the half-yearly examinations on board ships are of much value?—Yes.

2102. Judging from what we hear of the knowledge, or rather of the ignorance, of the sub-lieutenants when they come here, they do not appear to succeed in really causing the men to retain the knowledge that they took with them out of the "Britannia." We are told that they have forgotten all their mathematics; if that is the case, the instruction and the examinations in the intermediate time do not seem to have any great result?—I am sorry that your inquiries have led you to that conclusion. I have no means of arriving at the results, such as you have had an opportunity of doing. I am very sorry that no better results are obtained, but I do not see why they should not be. Whether the system has been long enough established to have

got into working order or not, I have no information to enable me to say. It evidently is a system which requires to be very carefully watched and insisted upon.

2103. Do you not think that the practical use of an examination depends very much upon the result being known soon afterwards, both to the instructors and to those who are instructed?—Yes, as a general proposition, but not in this case. I think if we trace a lad from the "Britannia" onwards, we find that he has very little means of instruction at all, and it is difficult for him even to retain what he has acquired; but I think both he and his instructors would be stimulated by Dr. Hirst's periodical reports on these examinations. I do not think that the midshipmen do get much actual knowledge while at sea, whether there is a naval instructor on board with them or not; I speak of that sort of knowledge which is taught by Naval Instructors. I can show you now several of the test papers that the sub-lieutenants have passed on coming here, in order to show what they can do. I think you have seen the book which contains their marks on leaving. These (*producing some papers*) are a few of the test papers, and among them you will find the very last.

2104. (*Rev. H. A. Morgan.*) Had they worked up for a month or so beforehand?—No, because they came straight from the "Excellent."

2105. (*Chairman.*) We heard of one who passed there on the Friday, and came here on the Monday?—That is the case with all of them.

2106. It appears that formerly the results of the examinations afloat were tabulated in this way (*handing a paper to the witness*), but that has been given up, and all that is now communicated is something of this sort (*pointing to another paper*)?—My own opinion is that the whole of the results of the examinations afloat ought to be forwarded to the ships with the whole of Dr. Hirst's report, unless there were anything confidential in it. I have not been informed, and I really was not aware in what form they went. When I say that I think it is an admirable thing to continue these examinations, I mean if information of the results is given. You cannot inform them at the moment, of course, how they stand as compared with others, because the papers must all come to England to be examined.

2107. Admiral Sir Cooper Key did not seem at all to expect that they would learn anything more on board ship. He says the utmost which they can do when they pass as sub-lieutenants is very little beyond what they are supposed to know when they leave the "Britannia"?—You have the final papers of the "Britannia" before you, and you have also the papers which they pass on entry here. I apprehend that a comparison of those papers would bear out Sir Cooper Key's statement very much; and then, if you look at the marks they obtain when they pass out from here—I mean the number of marks which is sufficient to scrape through with—it would convey to the mind the impression that it is a very elementary amount of knowledge.

2108. (*Rev. H. A. Morgan.*) We have had evidence to show that they often forget almost everything at sea; a great deal, at all events?—Yes, they forget a great deal.

The witness withdrew.

Adjourned.

APPENDIX.

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Professorial Staff, Royal Naval College; showing Remuneration for Services, and Attendance required, &c.—continued.

Subjects of Instruction.	Title.	Name.	Salary or Remuneration.	Date of Appointment.	Amount of Time spent in instructing.		Number of Students.	Description of Students.	
					Mode of Instruction.	Hours employed.			
Physics	Professor	A. W. Reinold, M.A.	600 <i>l.</i> per annum, with superannuation.	1 July 1873	Lectures and preparation	Two days in each week - Mondays, Tuesdays, Wednesdays, and Thursdays.	Morning. — 11 to 1	111 (average).	Gunnery Lieutenants, Half-pay and Marine Officers, Engineers, Naval Architects, and Private Students.
Ditto	Assistant to Professor	J. W. Waghorn, F.R.S.N.A. (Engineer, R.N.)	9 <i>s.</i> a day full pay, and 120 <i>l.</i> per annum salary.	4 Aug. 1875	Practical instruction - General superintendence of duty performed by Assistants, viz. — Lectures and instruction	Friday - Tuesdays and Thursdays - Monday to Friday - Saturday	— 10 to 1 10 to 1	13 (average on each day).	Gunnery Lieutenants, Half-pay Officers, Marine Officers, Engineer Officers, Also Assistant Engineers, Naval Architects, and Private Students.
Ditto	Demonstrator	A. Haddon	150 <i>l.</i> per annum	1 Sept. 1873	Attendance	Monday to Friday - Saturday	10 to 1 10 to 1	—	Acting Sub-Lieutenants and Probationary Lieutenants R.M.A. Ditto ditto (going up for examination). —
Fortification	Professor	Captain J. L. Needham, R.M.A.	450 <i>l.</i> per annum	1 Oct. 1878	Lectures and Drawing (Fortification). Ditto (Permanent Fortification). Ditto (Field Fortification). Lectures on Military History. Surveying (out-door) Topographical Drawing	Monday and Thursday - Monday and Friday - Tuesdays and Thursdays - Tuesdays and Fridays - Wednesday - Saturday - Every day	9 to 11 — — 9 to 10 All day. 9 to 11 11 to 12	8	Probationary Lieutenants R.M.A. of 1st year. Officers R.M.A. and Probationary Lieutenants R.M.A. (2nd year), Gunnery Lieutenants, Officers R.M.A., and Half-pay Officers. Probationary Lieutenants R.M.A. (1st year) and Marine Officers.
Steam	Instructor	John Yeo, F.R.S.N.A., Engineer, R.N.	9 <i>s.</i> a day full pay, 175 <i>l.</i> per annum salary.	1 July 1876	Lectures and instruction	Monday, Tuesday, Thursday, and Friday. Monday and Friday - Wednesday - Saturday	10 to 11 — — 10 to 12	—	Acting Sub-Lieutenants. Half-pay Officers.
Ditto	Officer assisting	W. J. Canter, Engineer of "Arrow" gunboat.	10 <i>s.</i> a day full pay, 1 <i>s.</i> a day charge allowance.	20 Oct. 1873	Practical instruction at Engineering Works. Preparing Lectures. Assisting in instruction generally. Lectures and instruction	— Monday and Friday - Tuesdays and Thursdays - Tuesdays and Fridays	— 4 to 5	—	Acting Sub-Lieutenants going up for examination.
French	Professor	Chas. Cassal, LL.D.	200 <i>l.</i> per annum	1 Oct. 1873	Lectures and instruction	Tuesdays and Thursdays	—	27	Half-pay and Marine Officers.
Ditto	Instructor	Jules Penon	250 <i>l.</i> per annum	5 Aug. 1874	Instruction	Tuesdays and Fridays	9 to 10 11 to 1 10 to 11	—	Acting Sub-Lieutenants, &c. Probationary Lieutenants R.M.A., 1st term.
					Thursday - Tuesdays and Thursday - Wednesday - Saturday	— — 9 to 12 13 to 1 9 to 11 11 to 12	— 2 to 4 2 to 4 3 to 4 —	8	Acting Sub-Lieutenants. Half-pay Officers. Acting Sub-Lieutenants, &c. Probationary Lieutenants R.M.A., 1st term.
								19	Acting Sub-Lieutenants.
								16	Acting Sub-Lieutenants, &c.
								17	Acting Sub-Lieutenants. Engineer Officers.

Professorial Staff, Royal Naval College; showing Remuneration for Services, and Attendance required, &c.—continued.

Subjects of Instruction.	Title.	Name.	Salary or Remuneration.	Date of Appointment.	Amount of Time spent in instructing.		Number of Students.	Description of Students.
					Mode of Instruction.	Hours employed.		
Nautical Surveying	Instructor	Staff Commr. V. F. Johnson.	19s. a day full pay, 7s. 3d., and 1s. 6d. a day surveying, lodging, and provision allowances.	1 Nov. 1873	Instructions and Observing (if Sun visible). Instruction	Monday, Tuesday, Thursday, and Friday. Saturday, Tuesday, Thursday, and Friday. Wednesday	Morning. 9 to 1 9 to 13 2 to 4 All day afloat in Summer.	Acting Sub-Lieutenants and Candidates for Naval Instructorships. Half-pay Officers. Ditto.
Naval Architecture	Ditto	W. H. White, F.R.S.N.A. (also Assistant Constructor at the Admiralty).	21. 2s. a lesson 30s. a lecture	1 Oct. 1873	Individual instruction Lecture	Tuesday and Friday Wednesday	2 to 5 9 to 10	Naval Architects and Private Students.
Shipbuilding	Ditto	W. B. Baekcomb (also Overseer of Contract Work under Admiralty).	21. 2s. a lesson	1 Oct. 1873	Individual instruction Lectures on Shipbuilding. A special course.	Monday, Friday	2 to 5	Ditto. For benefit of officers generally.
Marine Engineering	Ditto	Altd. Moreton, F.R.S.N.A. (Engineer, R.N., employed in Department of Engineer-in-Chief at Admiralty).	Ditto	1 Oct. 1873	Individual instruction	Tuesday, Friday	2 to 5	Engineers and Assistant Engineers and Private Students.
Marine Engine Drawing.	Ditto	John Maxton	Ditto	1 Oct. 1873	Ditto	Monday and Wednesday	2 to 5	Ditto ditto.
German	Ditto	Dr. Eugene Oswald, M.A.	13s. a month	4 Nov. 1873	Lectures and instruction	Tuesday, Thursday	2 to 4	Half-pay, Marine, and Probationary Marine Officers.
Spanish	Ditto	Mariano Vives	30s. a lesson	15 Nov. 1873	Ditto	Ditto	2 to 4	Half-pay and Marine Officers.
Freehand Drawing	Ditto	A. A. Hunt	28s. a month	10 Nov. 1873	Individual instruction Out-door Sketching	Monday, Tuesday, Thursday, Friday. Wednesday	2 to 4	Half-pay and Marine Officers and probationary Officers R.N.A.
Mathematics, Navigation, and Nautical Astronomy.	Ditto	T. S. Osborn (Naval Instructor, R.N.)	18s. a day full pay and 250s. per annum commuted allowance.	26 Jan. 1873	Lectures and Instruction Lectures on Navigation. A special course.	Monday, Tuesday, Thursday, Friday, Saturday	9 to 1 9 to 13 2 to 4	Acting Sub-Lieutenants and Acting Navigating Sub-Lieutenants. For benefit of officers generally.
Ditto	Ditto	Rev. F. Davies, M.A. (Chaplain and Naval Instructor, R.N.)	24s. a day full pay, 3s. 6d. and 1s. 6d. a day lodging and provision allowances, and 100s. a year for tuition.	7 July 1874	Instruction	Monday, Tuesday, Wednesday, Thursday, Friday, Saturday	9 to 1 to 1 to 12	Acting Sub-Lieutenants and Acting Navigating Sub-Lieutenants.
Ditto	Ditto	Wm. Silver (Naval Instructor, R.N.)	14s. a day full pay and same allowances as Mr. Davies.	31 Aug. 1875	Ditto			

No. 2.—TABULATED STATEMENT of EXAMINATIONS conducted under the direction of the PRESIDENT of the ROYAL NAVAL COLLEGE during the Year.

Character and object of the Examination.	Where held.	How often.	For how long at a time.	By whom, and by how many, attended.	By whom conducted, and, if by salaried Officers, whether with or without extra payment.	Scale of Payment.
To test results of the various courses of study pursued at the Royal Naval College, and to determine Qualifications for and classes of Certificates to be given. <i>Note.</i> —Examinations are also held on entry, and at Christmas and Easter to test progress. These are conducted by the respective Instructors.	Royal Naval College	Once a year (in June)	10 to 12 days -	Lieutenants qualifying in Gunnery. Probationary Lieutenants of Royal Marines. Half-pay and other Officers pursuing a voluntary course of study. Students of Marine Engineering. Do. Naval Architecture. (Total number 136.)	In Marine Engineering and Naval Architecture (practical), and in Nautical Surveying, by Officers (salaried or on full pay) from the Admiralty. In other subjects, by external Examiners.	(The Examiner in Physics is paid 85 <i>l.</i> a year for all the examinations.) Generally, 5 <i>l.</i> for each paper of questions set, and 5 <i>l.</i> for examination of every 30 papers of answers, or fractional part of 30.
Preliminary examination of Candidates for Naval Instructorships.	Ditto	Occasional -	3 days (or $\frac{1}{2}$ day if Candidate is a Graduate of a University). -	Candidates for Naval Instructorships. (One examined each time.)	By Naval Instructor borne for examination duties, assisted by the Instructor in French, without extra payment.	A fee of 4 <i>l.</i> 4 <i>s.</i> each, for each examination.
Qualifying examination (in Mathematics, Navigation, &c.) for rank of Lieutenant or Navigating Lieutenant; also final examination for Naval Instructorships.	Ditto	Every month, except January and July.	8 days -	Acting Sub-Lieutenants, Acting Navigating Sub-Lieutenants, and Candidates for Naval Instructorships. (Average number 14.)	By a Naval Instructor (on full pay) specially borne for examination duties, without extra payment, except in— Steam, conducted by Instructor in Applied Mechanics at College (on salary). Nautical Surveying, by an Officer of the Hydrographic Department of the Admiralty. French, by Professor of French at College (see note). Physics, by outside Examiner in this subject - - - By the Naval Instructor specially borne for examination duties, assisted by a Naval Instructor from a Flag Ship without extra payment, except in— French, conducted by Professor at College	Fee of 10 <i>s.</i> for each Candidate examined, with minimum of 5 <i>l.</i> Annual allowance in full for all the examinations, as stated above.
Entry examination for Naval Cadetships.	Ditto	Twice a year -	2 $\frac{1}{2}$ days -	Candidates nominated by Admiralty. (Average number 65.)	By the Naval Instructor specially borne for examination duties, without extra payment, assisted as in examination for Cadetships, except in— Physics, by outside Examiner in this subject - - - French, by Professor at College Optional Languages or Drawing, by Examiners specially engaged - - -	Fee of 15 <i>l.</i>
Entry examination for Assistant Clerks in the Navy.	Ditto	Occasional -	5 days -	Candidates nominated by Admiralty. (Average number 20.)	By the Naval Instructor specially borne for examination duties, without extra payment, assisted as in examination for Cadetships, except in— Physics, by outside Examiner in this subject - - - French, by Professor at College Optional Languages or Drawing, by Examiners specially engaged - - -	By annual allowance, as above. 10 <i>s.</i> for each candidate, with minimum of 5 <i>l.</i> Fee according to service, with minimum of 5 <i>l.</i> 5 <i>s.</i> for Drawing and 2 <i>l.</i> 2 <i>s.</i> for a language.

Tabulated Statement of Examinations conducted under the direction of the President of the Royal Naval College during the Year—*continued*.

Character and object of the Examination.	Where held.	How often.	For how long at a time.	By whom, and by how many, attended.	By whom conducted, and, if by salaried Officers, whether with or without extra payment.	Scale of Payment.
To test results of course of study in H.M.S. "Britannia" of cadets of all four terms, and to classify those passing out.	In H.M.S. "Britannia."	Twice a year, July and December.	7 days	Cadets under instruction in H.M.S. "Britannia." (Average number 165.)	Naval Instructor specially borne for examination duties without extra payment, assisted by two other Naval Instructors, except in— French, conducted by Professor at R. N. College Freehand Drawing, by Art Examiner from South Kensington	Gratuity of 10 <i>l.</i> to one on full pay, and 15 <i>l.</i> to one on half pay. Fee of 5 <i>l.</i> a day, with limit of 30 <i>l.</i> and travelling expenses and subsistence. Fee of 5 <i>l.</i> 5 <i>s.</i> a day, with travelling expenses and subsistence.
Annual examination of Junior Executive Officers in Fleet. <i>Note.</i> —The examination papers for the intervening examination (in December) are prepared and sent out from the College.	On board their ships	Once a year, July	9 days	Acting Sub-Lieutenants, Midshipmen, and Naval Cadets, and corresponding Officers of Navigating class serving in H.M. Fleet. (Average number 300.)	Naval Instructor specially borne for examination duties without extra payment, assisted by one other Naval Instructor	Paid difference between full and half pay while so employed.
To test results of the course of study in the schools in Her Majesty's dockyards and (once a year) to select the apprentices for the advanced course at Greenwich.	At the five dockyards	Twice a year (January and July).	Three days in January; five days in July.	Engineer students and shipwright apprentices. (Average number 450.)	Naval Instructor specially borne for examination duties, assisted, in July, by the salaried Instructors in Mathematics at the College, all without extra payment; and in January by an additional Naval Instructor, except in— Descriptive Geometry by an outside Examiner And in Engineering and Practical Ship-building by professional officers from the Admiralty, without extra payment.	Difference between full and half pay while so employed. Fee of 7 <i>l.</i> or 10 <i>l.</i>
To test qualifications of candidates for Interpretships.	Royal Naval College	Occasional	One day each	Naval officers desiring to qualify for interpreters. (One candidate each time.)	In French, by Professor at College In German, by Instructor in College In other languages, by Examiners specially engaged	Fee of 4 <i>l.</i> 4 <i>s.</i> in each case.

Note.—The French Professor at the College is paid a salary for attending to instruct the voluntary Students of the College on two afternoons in each week during the session. The Professor can therefore be regarded only in the light of an outside Examiner. The same remark applies also to the German Instructor, who is paid a monthly rate for two afternoon attendances in the week; neither Professor nor Instructor examines any Candidate in whose instruction he has taken any part.

Royal Naval College,
9th November 1876

E. G. FANSHAWE,
Admiral, President.

No. 3.—FEES PAID OR TO BE PAID in respect of EXAMINATIONS conducted under the direction of the PRESIDENT of the ROYAL NAVAL COLLEGE during the Year 1876.

Examination.	Name of Examiner.	Subject of Examination.	Fee paid or to be paid.	How arrived at.
Examination of all Students (except Acting Sub-Lieutenants, &c.) at end of session.	Prof. W. D. Niven, M.A.	Mathematics	£ 50 0 0	Lump sum for work.
	Mr. H. M. Taylor, M.A.	Ditto	50 0 0	
	Prof. A. W. Williamson, F.R.S.	Chemistry	20 0 0	
	Prof. W. C. Unwin	Strength of Material and Hydraulics.	20 0 0	
	Prof. O. Reynolds	Applied Mechanics; Heat, Steam, and Steam-engine.	35 0 0	Based generally on scale of 5 <i>l.</i> for each paper of questions, and 5 <i>l.</i> for examination of every 30 papers of answers, or fractional part of 30.
	Dr. R. Wormell	Descriptive Geometry	10 0 0	
	Mr. Wm. John	Stability of Ships, Theory of Waves, &c.	20 0 0	
	Capt. C. C. King, R.M.A.	Fortification, Military Surveying, &c.	25 0 0	
	Prof. T. Karcher	French	15 0 0	
	Dr. R. Rost	German	10 0 0	
	Don V. Carras	Spanish	5 0 0	
	Mr. J. Wright (Admiralty)	Marine Engineering	36 15 0	
	Mr. N. Barnaby (do.)	Shipbuilding	36 15 0	
	Staff-Comm. H. R. Harris (do.)	Marine Surveying	10 0 0	
Monthly examinations for rank of Lieutenant. (10 in year.)	Prof. Chs. Cassal, LL.D.	French	85 0 0	10 <i>s.</i> for each candidate examined, with minimum of 5 <i>l.</i>
	Mr. T. A. Hearson (Instructor in Applied Mechanics, Royal Naval College).	Steam	42 0 0	4 <i>l.</i> 4 <i>s.</i> for each occasion.
	Staff-Comm. H. R. Harris (Admiralty).	Nautical Surveying	42 0 0	Ditto.
Entry examinations for Naval Cadetships. (2 in year.)	Prof. Chs. Cassal, LL.D.	French	30 0 0	15 <i>l.</i> for each occasion.
Entry examination for Assistant Clerkships. (2 in year.)	Prof. C. Cassal, LL.D.	French	19 0 0	10 <i>s.</i> for each candidate examined.
	Mr. H. A. Bowler (Science and Art Department).	Freehand Drawing	10 10 0	5 <i>l.</i> 5 <i>s.</i> for each occasion.
	Dr. Eng. Oswald, M.A.	German	7 2 0	2 <i>l.</i> 2 <i>s.</i> on one occasion (for one candidate), and 5 <i>l.</i> on the other (for four candidates).
Periodical examination of Cadets in H.M.S. "Britannia." (2 in year.)	Rev. W. E. Smith, B.A. (Chaplain and Naval Instructor).	Mathematics and all subjects, except as below.	20 0 0*	Gratuity of 10 <i>l.</i> on each occasion.
	Mr. R. A. Fowler (Retired Naval Instructor).		30 0 0	Fee of 15 <i>l.</i> on each occasion.
	Prof. C. Cassal, LL.D.	French	40 0 0*	5 <i>l.</i> a day (or maximum of 20 <i>l.</i>) on each occasion.
	Mr. H. A. Bowler (Science and Art Department).	Freehand Drawing	21 0 0*	5 <i>l.</i> 5 <i>s.</i> a day on each occasion. * Paid also travelling expenses and subsistence at 1 <i>l.</i> a day each.
Examination of Engineer Students and Shipwright Apprentices at Dockyards. (2 in year.)	Dr. R. Wormell	Descriptive Geometry	17 0 0	10 <i>l.</i> for examination in January, 7 <i>l.</i> for examination in July.
Examination of Candidates for Interpreterships.	Prof. C. Cassal, LL.D.	French	4 4 0	4 <i>l.</i> 4 <i>s.</i> on each of two occasions.
	Dr. Eng. Oswald, M.A.	German	8 8 0	

The following is an engagement for the present year:—

Examinations, of College at end of session, for rank of Lieutenant, of Candidates for Assistant Clerkships, of Students in Dockyards.	Prof. A. W. Rücker	Physics	85 0 0	For the year.
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Royal Naval College,
9th November, 1876.

E. G. FANSHAWE.
Admiral, President.

No. 4.—SPECIAL COURSES OF LECTURES IN SESSIONS 1873-74, 1874-75, 1875-76, showing also those proposed, but not yet sanctioned by the Admiralty, for the Session 1876-77.

ROYAL NAVAL COLLEGE COMMITTEE:

Subject.	Name of Lecturer.	1873-74.		1874-75.		1875-76.		Proposed for 1876-77.		For whose Benefit delivered.
		Number of Lectures.	Fees paid.	Number of Lectures.	Fees paid.	Number of Lectures.	Fees paid.	Number of Lectures.	Fees proposed.	
International Law	Right Hon. M. Bernard, D.C.L.	10	10 <i>l.</i> 10 <i>s.</i> a lecture.	3	No fee	6	10 <i>l.</i> 10 <i>s.</i> a lecture.	—	—	Officers at college generally.
The Laws of War at Sea	Ditto	—	—	—	—	—	—	6	10 <i>l.</i> 10 <i>s.</i> a lecture.	
Magnetism in connection with Iron Ships	The Astronomer Royal	4	No fee	—	—	—	—	—	—	
Ditto	Staff-Commander W. Mayes, R.N.	—	—	—	—	2	5 <i>l.</i> 5 <i>s.</i> a lecture.	—	—	
The Safety of Ships	* W. H. White, Esq., F.R.S.N.A.	4	10 <i>l.</i> for the whole.	—	—	—	—	—	—	
The Behaviour of Ships at Sea	Ditto	—	—	6	3 <i>l.</i> 3 <i>s.</i> a lecture.	—	—	—	—	
The Structural arrangements of Modern Ships of War	Ditto	—	—	—	—	5	5 <i>l.</i> a lecture.	—	—	
The Tonnage and Propulsion of Ships	Ditto	—	—	—	—	—	—	5	Fee not settled.	
The Strength of Materials and Structures	* Professor J. H. Cotterill, M.A.	—	—	10	No fee	—	—	—	—	
Applied Mechanics and Strength of Materials	* T. A. Hearson, Esq., R.N., F.R.S.N.A.	—	—	—	—	8	No fee	10	No fee paid hitherto.	
Combustion	Ditto	—	—	—	—	8	No fee	8	10 <i>l.</i> 10 <i>s.</i> a lecture.	
Metallurgy	J. A. Phillips, Esq., M.I.C.E.	—	—	5	10 <i>l.</i> 10 <i>s.</i> a lecture.	—	—	9	No fee	
Meteorology	* J. K. Laughton, Esq., M.A., R.N.	—	—	6	No fee	8	No fee	8	No fee	
Naval History	Ditto	—	—	—	—	6	3 <i>l.</i> 10 <i>s.</i> a year for course.	7	3 <i>l.</i> 10 <i>s.</i> a year for course.	
Navigation and Nautical Astronomy	* T. S. Oborn, Esq., R.N.	—	—	30	No fee	—	—	30	No fee	
Marine Boilers and Engines	* Richard Sennett, Esq., R.N., F.R.S.N.A.	—	—	6	3 <i>l.</i> 3 <i>s.</i> a lecture.	—	—	—	—	
Ditto	J. A. Bedbrook, Esq., R.N., F.R.S.N.A.	—	—	—	—	4	5 <i>l.</i> a lecture.	—	—	
Ditto	* Alfred Morecom, Esq., R.N., F.R.S.N.A.	—	—	—	—	—	—	5	5 <i>l.</i> a lecture.	
Practical Shipbuilding	* W. B. Baskcomb, Esq.	—	—	A course	No fee	8	No fee	8	No fee paid hitherto.	
Modern Tactics (operations of Seamen and Marines on shore).	* Capt. J. L. Needham, R.M.A.	—	—	—	—	5	No fee	5	No fee	
The Atmosphere as a Vehicle for Transmission of Signals at Sea.	Professor Tyndall, F.R.S.	—	—	—	—	1	—	—	—	
The effect of Artillery Fire on Armour	Captain Orde Browne, R.A.	—	—	—	—	—	—	3	10 <i>l.</i> 10 <i>s.</i> a lecture.	

* Professors or Instructors at the College.

Royal Naval College,
6th December 1876.

E. G. FANSHAWE,
Admiral, President.

No. 5.—LETTERS from ADMIRAL FANSHAWE and DR. HIRST respecting the DUTIES of the DIRECTOR of STUDIES.

Royal Naval College,
Dec. 6th, 1876.

DEAR SIR,

I ENCLOSE a copy of an official letter I have received from Dr. Hirst, which relates to the evidence he gave to the Committee; and I therefore request you will be so good as to lay it before them.

Perhaps I may express to the Committee my hope that Dr. Hirst will still be able to continue his very valuable reports on the yearly examinations of midshipmen at sea; and, with reference to item 5 of his resumé, respecting the examination of the cadets in the "Britannia," I would express an opinion that the procedure in these examinations should remain as at present, until a thoroughly well-considered scheme for improving them, whilst retaining their independent character, has been completed. But as Mr. Goodwin is quite competent to conduct the examinations (*visd voce* or other), as an independent examiner, Dr. Hirst might very well be exempted from necessary personal attendance on board the "Britannia" on every occasion: he revising the general results, and deciding doubtful points authoritatively.

I take this opportunity to request you to state to the Committee on my behalf that I am extremely desirous to ask their attention to a point which is intimately connected with the evidence I gave, as to the sufficiency of the number of instructors of the acting sub-lieutenants, viz.: the competency of these instructors. To incite these officers, who are emancipated from the restraints of military discipline, to apply themselves to their work with vigour and diligence requires special qualities in their instructor; and I doubt whether the staff is not in this respect capable of improvement, to the great benefit of the sub-lieutenants.

It would, I think, be very advantageous if the enquiries of the Committee should elicit clear evidence on this subject.

Faithfully yours,
E. G. FANSHAWE.

The Secretary,
Royal Naval College Committee.

DEAR SIR,

Paris, November 29th, 1876.

I WAS asked by a member of the Committee, Mr. Lingen (see Question 479 of my evidence), to put on paper any specific propositions which I desire to have considered for the relief of my own branch of the college administration, and expressed my readiness to do so. Since then I have revised my evidence, and I am of opinion that all that remains to be said should be addressed to yourself. I leave entirely to your own discretion the question of communicating to the Committee the remarks I have now the honour to make.

After mature deliberation on the causes which have necessitated an application for the four months' rest which I am about to take, I am now quite persuaded that I must not again undertake the same amount of responsible work as I have done hitherto. I must confine myself for the most part to what I originally undertook to do, viz., to direct the studies of the officers at the college; and I must ask to be relieved in future from direct responsibility in connection with the details of all examinations other than those which are passed by officers actually studying at the college.

By details I mean, amongst other things, the preparation of the examination papers in accordance with regulations, the reporting upon the answers of the candidates, and the

arrangements for the conducting of the examinations in question, at the college or elsewhere.

I am quite prepared, however, in addition to my duties as director of college studies, to exercise a *general* supervision over the examinations to which I allude, and over the course of instruction given in the "Britannia" and in the dockyard schools; for I still hold the opinion originally expressed to your predecessor, Sir Cooper Key, that all questions concerning such courses of study, and the regulations relating to all examinations passed by officers who may ultimately come to the college for study, should, in the interests of the service, be referred to us for consideration and report. It is only by such means, I submit, that unity of purpose in naval education as a whole can be secured.

I do not think, however, that I ought in future to undertake to do more than exercise this general supervision, than act, in short, as your adviser and referee. Hitherto, I may add, the duties from which I seek relief (duties the performance of which was never contemplated by me when I accepted the appointment offered to me at Greenwich) have absorbed quite half my time.

I have stated in my evidence before the Committee how the relief I seek might be provided for without materially disturbing present arrangements. With your permission, I will give a brief resumé of the recommendations I ventured to make, with amplifications on one or two points.

1. Mr. Goodwin might assume all the responsibilities from which I seek relief; he is perfectly well qualified to do so.

2. To this end he might have some such title as "Deputy Examiner"; his salary should not be less, I think, than 500*l.* in the whole; and he would require the permanent assistance of an examiner under him, who should not, I think, be a naval instructor, though he should be of good university standing, and receive an income of not less than 300*l.*

3. Mr. Goodwin would be directly responsible for the preparation of all examination papers, and for the sufficiency of the arrangements for conducting all extra-college examinations. He would report upon the results, and his reports might pass through my hands for information and comment, only when deemed desirable.

4. I should propose to delegate to him the periodical inspection of the Dockyard schools. It might be well, however, that I should continue to inspect them occasionally myself. In this I should be guided by his reports, which should pass through my hands for information and comment, when deemed desirable.

5. I purposely abstain from entering into any detail with respect to the future arrangements for conducting the examinations of the cadets in the "Britannia"; this important establishment is at present in a transition state. In consequence of the report of the late "Britannia" Committee, it has already (chiefly through the appointment of Mr. Aldous) been placed on a footing different from that which existed in Dr. Woolley's time.

It will suffice to say that Mr. Goodwin might provisionally continue to prepare the papers, and report upon the results, as he has virtually done already, but be more directly responsible for so doing.

6. I need scarcely say that I do not desire any alteration to be made as regards my present responsibilities in connection with the examinations of acting sub-lieutenants who come to the college for six months' study.

I am, &c.,
T. ARCHER HIRST.
The President
of the Royal Naval College.

No. 6.—A TABLE giving the NUMBERS and DESCRIPTIONS of STUDENTS at the ROYAL NAVAL COLLEGE on 1st January in the years 1875, 1876, and 1877.

Compulsory or Voluntary.	Duration of Course.	Description of Students.	Numbers on 1st January 1875.	Numbers on 1st January 1876.	Numbers on 1st January 1877.
Compulsory	Full course of 3 sessions	2nd Class Assistant Engineers	6	6	6
		Shipwright Apprentices	11	9	9
Voluntary	-	Private Students { English	1	1	—
		{ Foreign	7	8	6
Compulsory	For two sessions	Probationary Lieutenants, Royal Marine Artillery	6	4	13
	For two sessions, or one, according to Corps	Do. Royal Marines	—	7	—
		Do. Royal Marine Light Infantry	10	—	—
	For one session	Officers qualifying for Gunnery Lieutenants	16	19	18
	For six months course	Acting 2nd Class Assistant Engineers	25	18	26
		Acting Sub-Lieutenants	74	75	46
		Do. Navigating Sub-Lieutenants	16	11	4
		Officers qualifying for Naval Instructors	1	1	—
Voluntary	In genera for one session	Captains	3	2	2
		Commanders	3	—	7
		Lieutenants	43	56	39
		Staff Commanders	—	—	1
		Navigating Lieutenants	9	4	3
		Marine Officers	3	8	6
		Chief Engineers	2	2	—
		Engineers and 1st Class Assistant Engineers	9	7	3
		Total	245	238	188

E. G. FANSHAWE,
Admiral, President

No. 7.—CLERICAL ESTABLISHMENT, ROYAL NAVAL COLLEGE.

Name.	Designation.	Present Salary.	Nature of Duties, and Remarks.
PRESIDENT'S OFFICE.			
F. E. Raven*	Senior Clerk	£ 480	Rising by annual increments of 20 <i>l.</i> to maximum of 600 <i>l.</i> Acts as secretary to the President. Registry and charge of official records; conducting correspondence with Admiralty, dockyards, flag ships, &c., &c.; various duties relating to entry, joining, attendance, leave, and correspondence of students; preparation of lists for payment of allowances; estimates; prizes; charge of stationery, &c., &c.
J. F. Cherry*	Clerk	295 50	Rising by annual increments of 15 <i>l.</i> to maximum of 400 <i>l.</i> Is in receipt of an allowance of 50 <i>l.</i> a year as librarian; assists generally in the duties of the President's office, and acts for the senior clerk in his absence.
F. Huskisson*	Storekeeper and Cashier	450	Fixed salary of 450 <i>l.</i> per annum. Keeps the cash account of the Establishment; prepares for and pays salaries, wages, and local and incidental expenses; demands and accounts for all furniture and stores used in the Establishment; recovers sums due from officers and others; and keeps record of expenditure of Vote for Stores, &c.

* In occupation of an official residence.

No. 7.—CLERICAL ESTABLISHMENT, ROYAL NAVAL COLLEGE—*continued*.

DIRECTOR OF STUDIES' OFFICE.

Name.	Designation.	Present Salary.	Nature of Duties, and Remarks.
Robert Main	Senior Clerk	£ 480	Rising by annual increments of 20 <i>l.</i> to maximum of 600 <i>l.</i> Tabulating results of examinations for "Britannia," naval cadetships, assistant clerkships, dockyards, sub-lieutenants, and junior officers afloat, and any casual examinations conducted under the Director of Studies; copying reports and letters connected with these examinations.
H. F. Buller	Established Admiralty Writer.	153	Rising by annual increments of 5 <i>l.</i> to maximum of 160 <i>l.</i> Correspondence of Director of Studies connected with the College; record and charge of papers; arrangement of classes; arrangement of programmes of examinations of students at the College; correspondence with examiners respecting their papers; compiling the tabular statements of the results of examinations of students at the College, other than sub-lieutenants.

Note.—Messrs. Main, Raven, and Cherry were formerly on the staff of the Department of the Accountant-General of the Navy and were transferred for duty at the Royal Naval College, on the understanding that their scales of salaries were to be the same as in that Department, and that they should be interchangeable with gentlemen in the Department of the Accountant-General of the Navy.

Royal Naval College,
16th February 1877.

E. G. FANSHAWE,
President.

No. 8.—OBSERVATIONS OF PROFESSOR W. D. NIVEN ON THE MATHEMATICAL EXAMINATIONS at the end of the SESSION.

DEAR SIR,
Trinity College, Cambridge,
Jan. 29, 1877.

I BEG to submit the following observations to the Committee appointed to inquire into the affairs of the Royal Naval College.

The mathematical part of the examination at the end of each session is in two main divisions, viz.—(A) for acting 2d class engineers and dockyard apprentices; (B) and (C) for naval officers.

The course of study laid out for the (A) division is a comparatively extensive one, and if a student should have an intelligent and practical acquaintance with the principles of all the prescribed subjects, I should consider, with reference to his stock of knowledge and ability to apply it, that he had received a good training, and that he ought to be able to employ his mathematics in questions connected with the business of his profession. The general result of the examinations is this: two, three, or four candidates exhibit powers and knowledge in advance of the others, and I have on two or three occasions been highly pleased with the work of the best men, proving as it did that they had more or less mastered the subjects of the course. Then there comes a large proportion of the division whose aptitude for mathematics, or whose industry is more limited. This part of the class although capable of making a fair show in questions of a certain difficulty, do not to my mind reach a standard comparable with that implied in the course prescribed. Finally, there is a small residuum who may be said to have failed to profit much by the course.

As regards the (B) and (C) divisions the subjects are more elementary in their scope and treatment. The same examination papers are set to all the candidates; some of

the higher subjects, however, being taken up by only four or five candidates.

Considering the very short period during which the officers in division B1 (gunnery lieutenants) have instruction, and their knowledge of mathematics, very limited as I am informed, when they enter the College, I am bound to say that their appearances in examination at the end of the session are in the highest degree creditable. Within the range of their instruction, which, however, for the length of the session includes a great deal, this class, as a whole, has given me the greatest satisfaction, and the highest candidates have invariably done well.

Class C (first year probationary lieutenants, Royal Marine Artillery) is a small one. They have generally created in me a very favourable impression.

I cannot, however, on all occasions, praise the work of class B2 (half-pay and marine officers). This is a very large class, but as a rule the work sent up is not satisfactory. There is a large proportion of this class who do but very little, and there are very few in the class who make a really good appearance.

I have endeavoured to set down concisely the impressions I have formed regarding the various classes in the college, believing that what is desired of me is not a detailed statement, but the expression of my opinion. I may be allowed to say in conclusion that I think there is reason to be pleased with the work done in the College.

Believe me,

Yours very truly,

C. D. Loveless, Esq.

W. D. NIVEN.

No. 9.—ANNUAL EXPENDITURE on account of the ROYAL NAVAL COLLEGE at GREENWICH, since its ESTABLISHMENT (and Estimate for current Year).

Admiralty, 3rd February 1877.

Vote.		1872-73.	1873-74.	1874-75.	1875-76.	1876-77 Estimate.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
5	ROYAL NAVAL COLLEGE, GREENWICH:					
	Salaries, Pay, and Allowances of the Staff of the Establishment, Lecturers, &c., including Instructors borne on Ships' Books	744 19 7	10,762 9 2	14,959 3 6	16,449 12 6	17,141 0 0
	Wages and Allowances of Servants - - - -	204 0 8	4,275 14 2	6,532 16 1	7,141 10 2	7,488 0 0
	Police - - - -	56 18 9	653 15 10	763 13 6	1,487 7 7	1,500 0 0
	Allowances towards Mess of Officers, &c. studying - -	59 6 6	1,280 8 0 Officers on Full Pay, &c. 1,512 6 0 Officers on Half Pay.*	1,494 19 6	1,736 5 0	1,740 0 0
	Additional Pay to Students -	85 4 0	1,995 19 8	1,520 6 0	2,408 14 0	2,877 0 0
	Scholarships and Prizes - -	—	—	113 14 0	378 5 0	657 0 0
	Gas - - - -	—	904 13 9	1,722 0 1	1,665 15 8	2,000 0 0
	Water - - - -	—	173 3 0	228 15 2	192 6 9	200 0 0
	Use of Gymnasium (Greenwich Hospital School) - -	—	—	Included under Contingencies.		40 0 0
	Contribution to Greenwich Hospital Funds for use of Buildings	—	—	—	—	100 0 0
	Furniture, Coals, Stores, and other Contingencies - - -	9,331 12 1	16,754 19 3	6,946 5 10	4,854 12 6	4,308 0 0
	Examinations - - -	—	261 10 6	1,117 2 4	See below.	See below.
		10,482 1 7	38,574 19 4	35,398 16 0	36,314 9 2	38,051 0 0
5	CONDUCT OF EXAMINATIONS, ROYAL NAVAL COLLEGE - - -	—	See above.	See above.	1,417 2 1	1,488 0 0
5	NAVAL MUSEUM, GREENWICH - -	—	Included above.	1,474 18 0	787 6 6	1,055 0 0
11	NEW WORKS, &c., NAVAL COLLEGE	10,055 1 7	29,184 6 3	8,312 12 9	7,390 6 7	5,380 0 0
	TOTAL - - -	20,537 3 2	67,759 5 7	45,186 6 9	45,909 4 4	45,974 0 0

Note.—The above expenditure is exclusive of—

- (1.) Full Pay of Officers, &c. studying, borne on the Books of H.M. Ships, charged to Vote No. 1. Wages to Seamen, &c.
- (2.) Allowances towards Mess of ditto (except in the year 1873-74), charged to Vote No. 2. Allowances in lieu of Provisions, &c., being the ordinary Allowance of 1s. 6d. a day to Ships' Officers, &c. not victualled.
- (3.) Full Pay of Marine Officers studying, not borne on Ships' Books, charged to Vote No. 1. Subsistence of Commissioned and Staff Officers, R.M., on shore.
- (4.) Wages of Dockyard Apprentices, &c. studying, charged to Vote No. 6. Wages to Artificers, &c., Dockyards at Home.

(Signed) H. WALKER,
Accountant-General of the Navy, &c.

* In 1873-74 the Allowance towards the Mess of Officers borne on Ships' Books, studying at the College (1,512l.), was charged to Vote 5, as provided for, but in other years to Vote 2, their Full Pay throughout being charged to Vote 1.

This Return also does not include the cost of Stationery, Printing, &c. on account of the Royal Naval College, defrayed out of the Vote for H.M. Stationery Office (Civil Service Estimates), estimated at about 800l. a year.—C. D. LOVELESS.

No. 10.—MEMORANDUM on the EXAMINATIONS of DOCKYARD SCHOOLS, and on those of the ROYAL NAVAL COLLEGE at GREENWICH, by MR. C. W. MERRIFIELD.

In compliance with an official request to that effect, I met Mr. Gordon and Mr. Morgan, with Mr. Loveless, at Portsmouth, on the occasion of the half-yearly examination of dockyard students and apprentices, and, at the like request, I have made a memorandum of the remarks which occur to me on the subject.

1. I think it essential that the examinations should be conducted by persons independent altogether of those who either give instruction in the school or college examined, or direct the studies, or have personal control of the discipline.

2. I think the reports of the examiners should be addressed directly to the Lords Commissioners of the Admiralty, and by them communicated to whom they may concern.

3. I find that at present the dockyard students and apprentices are examined twice a year, and that only one set of examination papers is used on each occasion. Thus in each of the 12 half years during which a boy is going through the course of instruction, he gets a paper of exactly the same character set before him. So far as the examination therefore is concerned (apart from some purely

professional papers which are given to the advanced students only) there is nothing, except increased power of answering examples, to distinguish the work of the first year from that of the last. This necessarily prevents a proper organisation of the course of study in the school, or a proper sequence of study on the part of the student, who finds it pay better, so far as the result of his examinations is concerned, to get increased facility in working the easy questions, than to extend his knowledge. It is thus unfair to teacher and scholar too.

4. The publication of the class list in its present form enhances these evils. It is now simply a wholesale and unintelligent classification of all the students and apprentices, of all years of service, in one list, arranged purely by the number of marks assigned to the examination papers. No distinct classification is made of those who take the scholastic subjects only, from those who take the professional papers too. The list has to be completely re-cast and analysed before any useful result can be got from it.

5. It is clear to me that there ought to be different sets of examination papers for the different years of servitude. It would, however, entail much labour, and perhaps not very useful labour, to prepare six sets of questions every half year. This might be reduced, by holding the official examination only once a year, at the time (July) when alone it is really necessary for administrative purposes, and also, to a certain extent, by grouping the different years.

6. I have not sufficient detailed knowledge to recommend with confidence the exact mode of grouping the years. As a mere example of my meaning, and not as a recommendation, I would give the following:

First year	-	By itself.
Second „	-	Grouped together, with a few extra questions for third year.
Third „	-	
Fourth „	-	Grouped together, with extra questions for the later years.
Fifth „	-	
Sixth „	-	

7. With some such arrangement as this, I think it would be possible for the teachers to arrange courses of consecutive instruction more completely than they can now do, and, moreover, that there would be an inducement to consecutive study which does not now exist, the real inducement under the present system being to go over the elementary work again and again. That the elementary work should not be slighted in the later years, may easily be secured in the setting of the questions, or even, if necessary, by a "general paper" going over all the early ground, and rather highly marked.

8. A difficulty arises about this in the case of boys who are manifestly beyond or behind the class of their year. It would throw too great a responsibility on the schoolmaster or examiner to ask him to say that a given boy *shall* be advanced a year; because the boy would often prefer to remain head of the lower class, than to incur the risk of failure in a remove. The way out of this is, to allow the schoolmaster to submit a proposal, based on the result of the last official examination, and on his own opinion, that a boy who is clearly ahead of his class or year should be advanced a year, so far as his school instruction is concerned, and should receive an extra shilling a week on this account alone. This would give the schoolmaster a pull over the boys, which he very much needs. At present he has no power of punishing, except by reporting to the Admiral Superintendent, who, of course, if he does anything at all, comes down with destructive rather than corrective effect. This is too heavy machinery for small delinquencies, and especially for correcting indolence and slackness. The selection for Greenwich is confined to so few that it is not an incentive to the backward scholars. I should allow backward boys to degrade a year, on the like recommendation, if the schoolmaster could report that it was not from their own gross idleness, without loss of

wage; but with a loss of 1s. a week, or so, if it be from idleness or neglect.

9. Supposing the official examination to be held only once a year, in July, I think the schoolmasters themselves should examine their schools in December or January, the examination questions set by them to be printed for them, as also the class lists settled by them. The teachers in the different yards might, if they chose, act in concert, so as to save themselves in preparing questions; but no joint responsibility need be incurred, nor need the Government do more than give them the help of printing their questions and class lists in the form most convenient to the teachers.

10. I think it would be well if the official examination papers, at least in the mathematical subjects, gave the maximum marks for each question. That is an inducement to the examinee not to confine himself to picking out the easy questions only, e.g.,

- No. 7 [simple equation, easy] (5 marks).
 No. 8 [do. hard] (8 marks).
 No. 9 [quadratic equation, easy] (9 marks).
 No. 10 [do. hard] (12 marks).

This is done in the professional papers now set by the constructor's and engineer's departments of the Admiralty.

11. I think the greater part of the purely professional papers on the shipbuilding subjects must continue to be set in the Admiralty. There is no adequate knowledge, of the special kind needed, to be found in the universities, or in the private trade. On these subjects, the Royal Dockyards have a traditional knowledge which is peculiar to themselves, and far more complete than anything which exists outside. I do not extend these remarks to marine engineering. It is a mere matter of convenience whether those papers are set in the Admiralty, or not. I see no objection to their being set by the consulting engineer at Whitehall, because he is practically independent both of the dockyard schools, and of the practical instruction which is got in the shops. But I see no objection, either, in these papers being set by outside engineers, provided care be taken to secure the services of an examiner possessing theoretical as well as practical knowledge, and not to be guided in the selection of the examiner by mere professional eminence.

12. The remarks in the last paragraph apply to the Royal Naval College at Greenwich, as well as to the dockyard schools.

13. The supervision in the examination room itself at Portsmouth, which I visited, was unsatisfactory, and the arrangements bad. The examinees were far too close together, —at least two where there ought to have been one, and there was no one point from which the candidates tables were fully in sight. There was absolutely no security against copying either from books or from one another. I myself observed some of the examinees conversing with those near them, and signalling to others at a distance. I should judge that this part of the system requires not only whipping up, but entire re-organisation.

14. With regard to the examinations of the Naval College at Greenwich itself, I think it of the first importance that these should be conducted by a body quite independent of any person connected with the college, whether actually engaged in the teaching or discipline, or merely in the organisation or supervision. I think this of far more consequence as regards the college than in the case of the dockyard schools. But in these, too, inasmuch as their course of study is virtually prescribed, or at least recommended, by the authorities at Greenwich, I think it would be better if the examination test were to be applied by a completely independent authority, which should report directly to the Lords of the Admiralty.

C. W. MERRIFIELD,
 Education Department, Whitehall,
 18th January 1877.

No. 11.—MEMORANDUM ON DOCKYARD SCHOOLS, by the REVEREND OSBORNE GORDON, B.D.

The condition of the Dockyard Schools, if the one at Portsmouth is to be taken as a specimen, seems to me to require careful consideration.

The absolute want of any organization in them was strongly impressed upon me by my visit to that place, and the strange results exhibited in the class lists, as referred to in the body of the report, point to the necessity of considerable changes.

I agree in the main with the memorandum of Mr. Merrifield, but, like him, I feel that I have not sufficient

detailed knowledge to make positive recommendations. I therefore only offer what follows in the way of suggestion, and shall be satisfied if the Commission think it right to print it in the Appendix.

To begin with the admission of the youths into these schools, it seems to me that they should be regarded as holders of small scholarships. They are elected by public competition, and they are at once taken into the service and pay of the State, which provides the means for their education. If the number of these scholarships is large

(at present about five hundred) that does not make them less valuable to those that obtain them, and if their amount at first is small, it rises gradually to a considerable sum, and may lead on to positions of the highest importance in the naval service of the Country. At present, the increase is determined simply by age, and as a general rule this is not to be found fault with, but I think it might be advantageously modified by the relative progress and merit of the pupils. In Elementary Schools under the Education Department there are different standards of examination, corresponding to different ages, and I do not see why the same principle should not be adopted in their Dockyard schools. I propose three,—(1) for 1st and 2nd year; (2) for 3rd and 4th year; (3) for 5th and following years.

Looking to the subjects of examination for admission, I should add little to them for the first two years. Those will do well who make themselves thoroughly perfect in those subjects in that time. I would simply add logarithms and elementary trigonometry for the most advanced pupils.

After the first year's examination there would be found some fit for promotion to the second standard, and they should be promoted accordingly, receiving at once the pay of the third year, whether dockyard apprentices or engineer students. After the second year some would be found not fit for advancement, and they should remain where they are, receiving the pay of the second year.

The standard of the third and fourth years should include the former subjects carried on, and the new subjects of conic sections, analytical geometry, and elementary mechanics; and at the end of the third year the most forward boys should be promoted as above into the third standard with the corresponding increment of payment, and at the end of the fourth the most backward kept back in the second, beyond which they would probably never rise. A boy of genius and industry would thus be enabled to rise into the third standard in two years, receiving in his third year the pay of the fifth, the graduation of pay and progress going on concurrently. The third standard

should include differential and integral calculus, higher mechanics, and such other subjects as it is thought desirable to teach.

The position of the students should be determined by the result of the examinations held by the independent examiners each summer. Any scheme of this sort would be a great encouragement to boys of ability, and the monotonous weariness of the examination would be relieved by the constant introduction of fresh matter, and the prospect of more rapid promotion. I am disposed to think with Mr. Merrifield that the official examination should be held only once a year, though the masters themselves, in combination, might, as he suggests, hold one, to test the progress of their pupils, in December or January. This, however, should not affect the class list in July, which should be determined entirely by external examiners. The numbers of pupils in the third standard under this system would probably be reduced. A question might arise whether, with a view to economy and efficiency of instruction, it would not be better to bring all these students into one dockyard, instead of having them scattered about in five, though it appears there are no engineer students at Pembroke. The selected dockyard would thus become a school of a higher order, and take the place of an introduction to Greenwich, and it would be a marked honour to gain admission to it. The pay should go on from the fifth year, according to the scale at present fixed.

Mr. Merrifield has noticed it as a defect in the Dockyard schools generally, that the schoolmaster has no power of punishing whatever, except by reporting to the Admiral Superintendent of the Dockyard, and that this is too heavy machinery for small delinquencies. I suggest that he should have the power of fining to the extent of one-fourth of a boy's weekly pay, but that after doing this twice he should then report to the Superintendent.

O. GORDON.

ANALYSIS OF THE EVIDENCE.

ACTING SUB-LIEUTENANT A., R.N. - p. 44

Is acting sub-lieutenant, studying at the college for his examination, 1036, 37. Time at college, 1038. Time on board "Britannia" and afterwards at sea, ships he was in, instruction, and subjects examined in, 1039-64, 1137. No naval instructor on any of the ships, 1045. Did not bring his knowledge to college; only remembered navigation and nautical astronomy, 1065-68, 1125-27, 1138. Feels the want of further instruction in the college; cannot keep pace with the instructors, 1069-77. Gets assistance from a private tutor; what he pays for it, 1078-86. Perfectly impossible, with the knowledge he came up with, to succeed without it, 1112; with it, gets on tolerably well, 1131. Thinks that most of the acting sub-lieutenants get assistance from private tutors, 1087-91. Does not think he should want a private tutor if he came up knowing more, 1092. Comparison of college and "Britannia" examinations, 1093-97. Numbers in his classes; not sufficient individual instruction; classification, 1102-6, 1113-24, 1128-30, 1132, 33. Has worked nine hours a day since he has been at the college; finds it very hard work; his health stands it, but he sometimes gets rather muddled, 1107-11, 1136, 37. Has often regretted the want of instruction on board the ships he has been in, 1139-41.

ACTING SUB-LIEUTENANT B., R.N. - p. 47

Is acting sub-lieutenant, studying at the college for his examination, 1142, 43. Time at college, 1144. When he left the "Britannia," ships served in since, instruction, and examination, 1145-59. Had a naval instructor most of his time, 1147-49. When he came to the college, remembered only navigation and practical trigonometry, 1160-67, 1196-98. Thinks the instruction at the college might be better, but it is sufficient, if any one works, to enable him to pass; individual assistance, 1168-70, 1180-83, 1185-95, 1217, 18. Has never had a private tutor, and does not intend to have one; about half the sub-lieutenants do; thinks he will come out in the first class without external assistance, 1171-78. No doubt that many have private tuition to make up time wasted in the ordinary study hours, 1184. Thinks that those officers who expect to get into the first class nearly always dispense with private tutors; the more idle men generally employ them, 1199-1202. Thinks it would, generally, be felt as a serious addition to the expense of the college if an officer had to provide himself with private instruction, 1206. There is generally so much noise in the room in which algebra and Euclid are studied, through proper order not being kept, that it is difficult to learn much, 1191-94, 1204, 5. Time occupied in studies daily, 1208-12. His health has not suffered from so much head-work, 1214.

BURNEY, LIEUT., R.N. - p. 58

Has passed through the course of study as sub-lieutenant; left the college in October, 1876, and has obtained his promotion as lieutenant, 1464-66. Previous to going to the college was on board the "Britannia"; left in July 1870, 1467-68. Time at sea, and ships he served in, 1469-76, 1515-20. Was all his time with a naval instructor, 1476. Retained very nearly all the knowledge he brought out of the "Britannia," and advanced in mathematics, 1477-80. Extent of his mathematical knowledge when he came to the college, 1481-87. College instruction sufficient for himself, but not for others, 1488-90. No attempt at classification; those who could not keep pace with him were not separated from him, 1491-95; effect of this, 1543-45. His impression was that the sub-lieutenants generally made the best use of their time, 1496, 97. Many had private tutors; he had two, 1498-1505, 1534, 35, 1538, 1541, 42, 1546-48, 1566; the private tutors cram as much as they can, 1588. There was no noise except on rare occasions, 1511-14. Thinks they were taught nothing superfluous, 1521-23. The college examination was much more difficult than the "Britannia," 1524-27. Thinks there should be some voluntary lectures in

BURNEY, LIEUT.—cont.

physics after study is over, 1534-37, 1562, 63. Extension of college course, 1551-54, 1560, 61, 1564, 65. Worked about 11 hours a day all the time he was at college, 1555-59. Does not think it would be a good thing to make the "Britannia" examination stricter, 1567. Very little instruction in small ships, 1578, 79. Those who have instruction on board ship are better prepared than those who have not, 1580. Sub-lieutenants must take up all the subjects; number of marks to pass, 1583, 87, 1589, 90. Some who have been turned out of the service are much better seamen than others who remain in, 1591. Does not lay any very great stress upon the difference between a first class and a third class for the practical purposes of the navy, 1591-1601. There ought to be an interval between leaving the "Excellent" and coming to college; time wasted in taking Sights, 1602, 3.

CHEVALLIER, LIEUT., R.N. - p. 69

Is going through the course for gunnery lieutenant, 1854. His previous career, 1855-64. His instructors, 1868-72. Mode of instruction, 1873-77, 1918. Individual instruction; more time wanted, 1873, 1878-82. Mathematical knowledge on entry, 1883. Has no doubt he will pass, 1886. Has not found his health suffer from the work he does, 1887. Thinks none in his class have a private tutor, 1889, 90. Cannot thoroughly digest all the instruction in the lectures; would prefer a shorter course of lectures and more time for private study, 1891-93, 1918. Thinks the course of instruction should be lengthened; if the subjects are to be thoroughly learned there ought to be more time, 1894, 1916. Subjects, 1895-1913, 17.

CURME, CAPTAIN CHARLES THOMAS, R.N. p. 53

Has been one of the voluntary students; stayed nearly a session; left on the 30th of June 1874, 1347-49. His instructors; mathematical and other studies, 1350-58, 1369-71. Got every assistance, 1359-61, 1363. Number in his class, 1362. Thinks his session of study did him a great deal of good, but was much disappointed at the result of the examination, 1364, 69. Never heard of any of the voluntary students having private tuition; he wanted no outside assistance, 1367, 68. His opinion of the college scheme, 1372-74. Suggests a *sine quâ non* for commission as lieutenant, 1375-78. Thinks that any decently educated boy ought to be able to work the college sheet, 1378. What the college sheet includes, 1384. Has no doubt whatever that you could not do without naval instructors, but would attempt very little beyond the college sheet, practical steam, and surveying; does not believe it is possible to teach mathematics to boys between 13 and 18 or 19, 1379, 80, 1399. Suggests subjects of study, in a three months' course, for a cadet passing out of the "Britannia" in the third class, and with no turn for mathematics, 1381-85, 1390; at the end of that time, if they were fit for it, would require they should go on, 1401-7, 1411, 12. In the case of an officer with a somewhat greater aptitude for mathematics, an average student, thinks that the college course would make him a better officer, 1386. Official relation between Professor Lambert and Mr. Henry, 1388-90.

Case of two cadets who passed well in mathematics, and who went to sea with him in the "Repulse"; instruction they had on board, 1391-97. Thinks it would be better not to try after so high a standard in the "Britannia," 1398. Every officer who went into the navy ought to have a thoroughly good grounding in elementary mathematics, 1400. Does not approve of sub-lieutenants at Greenwich reading such subjects as elementary statics and hydrostatics, 1401. A man may have other very valuable qualities for a naval career without being a mathematician, 1403, 4. Would not turn the whole instruction so completely upon mathematics; at the same time considers it desirable that the navy should have a certain number of first-rate mathe-

CURME, CAPT.—*cont.*

maticians, especially on account of the difficult problems in gunnery and in the construction of ships, 1407-10, 1463. Five sixths of those that break down, do so from pure laziness or worse, 1413, 1427-29, 1445; thinks the remarks about idleness, and so on, do not apply to the engineers and such young men, 1433-37.

When he was at the college the quality of the teaching was admirable, but the staff was not large enough, and the consequence was that the sub-lieutenants were driven outside, 1415-17. Knows as a fact that they were working with private tutors outside, 1415, 18. Does not personally know any of the private tutors, 1419-21. All the naval instructors he has known have been efficient men; they go through a course of instruction in the college, and pass an examination, but, so far as he knows, there are no means of testing their teaching power, 1423, 24. Want of discipline in some of the class rooms, 1425, 26. His opinion of the cause of the rejection, lately, of seven out of twelve acting sub-lieutenants, 1427-29. Difference in discipline of the acting sub-lieutenants and the other students, 1430. As regards the voluntary students, there is nothing to be desired in the way of instruction, 1431, 32. Thinks it a good plan to examine the sub-lieutenants on entry, but practically it would be better to give a three months' trial to everybody. There is no reason why there should not be an entrance examination as well, 1438. Thinks a man might be a very good, trustworthy, and useful officer of the watch who is not able to do anything more than work the college sheet and observe, but he would be a very much better officer in every way if he had gone through the college course, 1439-43, 1446. Advantage to a captain of a knowledge of steam, 1444, 1447-49. Without at least an elementary knowledge of mathematics, an officer would be cut off from reading and study almost necessary in many parts of his career, 1450. For all practical work connected with the engine, a man might very well do without knowing anything of mathematics, 1453.

Thinks the examination an acting sub-lieutenant must pass before he can get his commission as lieutenant is somewhat unduly high, and that there are too many subjects, 1454-57. Thinks that when men are considerably older than others they do not do so well in examinations, 1458. Thinks it desirable for an officer who has a taste for mathematics to acquire some knowledge of conic sections, 1459, 60. Professional disadvantages of officers with no taste or capacity for mathematics, 1461. Languages are extremely valuable to a naval officer, and sketching also, 1461, 62.

FAIRIE, J. C., SUB-LIEUTENANT, R.N. - p. 62

Has just left the college, third class, 1604, 5. Marks required for a third class, 1606. Passed out of the "Britannia" in the second class, 1609. Time at sea, and ships he was in, 1611, 12. Naval instructor in two ships, but not in others, 1613, 14, 1651, 52. Managed to keep up his knowledge a little, he thinks; forgot his mathematics, 1615-23, 1653-57. Thought it better to take a private tutor; did not think there was sufficient assistance at the college, 1624-29. Thinks he would not have passed without a private tutor; if he had had more help from an instructor he might, 1646-50. Thinks the sub-lieutenants are generally industrious, 1631. The discipline was very easy, 1632-33. Thinks there was good discipline in the studies; thinks they were always quiet in the room, 1634-37. Could work the college sheet when he came; it is the exception not to be able to do so, 1638-40. Practical use of his studies, 1641-42. Number in his class; some more advanced than others, 1643-45, 1658. Difficulty in keeping up with the more advanced; mode of instruction, 1659-67. Thinks the course is long enough, 1668, 69. The college sheet, 1670-77.

FANSHAWE, ADMIRAL EDWARD G., C.B., PRESIDENT - p. 1, 75

Conversant with the course of instruction, and its details, 3. Staff of instructors generally sufficient. As there have been times when a pressure has arisen from the number of sub-lieutenants (which number fluctuates), it is exceedingly necessary that there should be a sufficient staff. Upon certain occasions there have not been enough instructors. Career of sub-lieutenants in their profession depends upon their passing examination; they come for six months, and some go every month. There are three persons who instruct them in the greater part of what they do, 4. In 1875, the

FANSHAWE, ADMIRAL—*cont.*

number of acting sub-lieutenants, &c. varied from 102 in February to 47 in September. Thinks 102 very far above the maximum likely to be reached again. Should say that three instructors are not enough for 102 officers, many being behindhand in elementary mathematics. Therefore the staff was short. Does not anticipate it will happen again, the classes being smaller, 5, 96, 99, 101-103. Thinks the staff sufficient for 50, but not for 100, 6, 7. Thinks the great number of sub-lieutenants examined in 1875 was due to a modification of a naval order, 8. When the number is at its maximum, the staff might be temporarily increased, 9. Provision for instruction in fortification is short, 9, 10, 71-76, 103. No deficiency of instruction for students who attend for three sessions, and for two sessions, 11-17, 26-29.

Dr. Hirst takes a prominent part in the supervision of the instruction, but does not instruct, 18, 19. Hands in a tabulated statement of the work of the professors and instructors, with remarks of his own in blue, 20, 21. Professor Miller's work somewhat higher than Professor Lambert's, the executive officers of the navy just now not requiring to go quite so high, 22. Professor Lambert perfectly able to go as high in his lectures as Professor Miller, 23. Difference in salary of 100*l.* a year; they should be placed on same footing, 24, 25. Dr. Hirst supervises the examinations for naval cadets twice a year; he also goes down to the "Britannia" examinations; the papers are set under his charge, and he conducts the *vis à voce* part; he has an assistant (a naval instructor), and borrows the chaplain and naval instructor of the "Duke of Wellington;" he also has under his charge various other examinations, 30, 42, 44-46. Dr. Hirst has one assistant, Mr. Goodwin, who has a great deal too much to do, 42, 43, 47. Dr. Hirst also inspects the dockyard schools; the examination papers which guide the course of instruction from the time the cadets first go to the "Britannia" until they pass their examinations at the college emanate from him, 47-50. Thinks that Dr. Hirst is overworked, and wants assistance, 51-57, 99, 100, 103. Thinks it essential to the navy that all the examinations should be superintended by one person, 58.

Does not know if it has been suggested that the examination of candidates for the "Britannia" might be placed in the hands of the Civil Service Commissioners; has no objection, 59, 60. The examination is not competitive, 60-62. The custom of valuing all questions in the examinations, whether difficult or easy, at about the same value, is not maintained; thinks it never existed at the college, 66-71. There are three classes of students; the first class are those for whom fixed and compulsory courses of study are arranged with reference to the duration of the session; the second class consists of those who come for six months; and the third class are those who come voluntarily, and for whom there is no fixed course of study, except mathematics, 77-87*a*. The course for the acting sub-lieutenants who come for six months is compulsory; they are under a much more stringent rule than the others, 89. The voluntary choice of subjects, except mathematics, is confined to the half-pay officers who come voluntarily, 90. Programme for acting sub-lieutenants; standard in each subject, 91-94. Number of failures, 95. Marks of candidate who fails in his first examination are not carried on; he goes up with a new batch, 96.

As there is a small observatory at the college, there must be somebody to teach the use of it. Dr. Hirst proposes that there should be a gentleman who has had a University education to give instruction in the use of the stationary instruments, and who should be associated with the staff commander, and in some degree assist him, 96. The three instructors in nautical astronomy and navigation are not qualified for this work, the instruments being stationary. The officers who take up surveying should be able, in a foreign country where there is an observatory, to know something about it; it is not a thing that a naval instructor necessarily knows; it requires one who has had experience in the work, 97, 98. Professor Lambert has one assistant, Mr. Gleed; Professor Miller one, Mr. Pole; and Mr. Laughton one, Mr. Solomon: these three are Cambridge men, 104, 105. The naval instructors are Mr. Oborn, the Rev. F. Davis, and Mr. Silver, and are permanently employed, 106, 107. The examiner in physics has a certain permanent sum, nearly all the officers in the different divisions being examined in physics. Believes it would be found more economical, and to work better, if the examiner in French were paid in the same way,

FANSHAWE, ADMIRAL—*cont.*

107. There is no marked difference between a professor and an instructor, except that the professor's duties are higher of their class, 108. The instructors are not grouped under particular professors, their duties being distinct, 109. The professors and instructors in the same branch of subjects do not give independent lectures, 110-113. Generally, the assistant's occupation is to give individual instruction under the professor, 114, 116-122. These instructors or assistants do not occupy the place of private tutors; none of them give private instruction. Believes that only the sub-lieutenants have private instruction, 115. The instruction of sub-lieutenants, including lectures, is specially made over to the assistant in physics; he is bound *ex officio* to give them what assistance he can, 121, 122. Attendance of the Professor of Physics and his assistant and demonstrator, 123-131.

Does not think that the acting sub-lieutenants who have had a naval instructor at sea enter the college, as a rule, better prepared than those who have not had that advantage; believes that nearly every one who has been rejected has been in a ship with a naval instructor, 132. Every officer afloat has to pass two examinations a year, whether he has a naval instructor or not, 133. Believes it is the practice, when the examination papers of an acting sub-lieutenant at sea who is under a naval instructor have been sent up and examined and marked, to communicate Dr. Hirst's observations upon those papers to the different ships; thinks it of extreme importance that Dr. Hirst's observations should be communicated to the fleet, 134, 135. There is no practical difficulty in the classification in a single college of such very various classes of officers attending for different purposes, 136, 137. Those whose attendance is compulsory fall mainly into two classes, it would be more correct to say three, because the engineers and the naval architects are entirely distinct in their studies from the higher class of naval officers, 138, 139. Thinks it highly improbable that any of the gunnery lieutenants would go, or would wish to go, into the naval architects' class, 140. Is of opinion that the students, as a whole, have sufficient means of individual instruction, 141.

The examination of half-pay officers who are in attendance is compulsory. Every person who is going through the sessional course has to be examined in June. Half-pay officers come and go; the Admiralty has wisely said that those who come to the college to study when they are on half-pay have the preference, 142. If one of those officers were to attend classes for five months, and, not being satisfied with his progress, were to leave, declining the examination, would report it to the Admiralty, 143. If any half-pay officer is found not to work reasonably, he is advised to go; if he did not, would report to the Admiralty, 144. Out of 117 who attended in 1875, only 37 attended the whole course, 56 were examined, and 26 obtained honorary certificates. Signs these certificates. Very striking, in looking at them, to see the amount of information disseminated in the navy which did not exist previously. These certificates were given on their examination; they all wish to get the letter "G" put to their names in the Navy List, 145, 146.

Backward students can obtain extra instruction from tutors in the neighbourhood, by paying for it; a considerable number of the sub-lieutenants do; very great advantage to the navy if a man who is ignorant gets instruction in that way, 147, 148. If a man is very backward, and his abilities are mediocre, thinks it absolutely necessary that he should have private instruction, 149. Is aware that private tuition is very frequently resorted to, but is not aware of the exact extent, 2077, 78. Does not think it necessary to inquire particularly into it, 2078. Thinks it could not be prevented, 2079, 80. The algebra, geometry, and trigonometry that he requires to know in order to pass are very little more than he was supposed to have known when he left the "Britannia," 150. All the examination papers of sub-lieutenants passing at the college for lieutenants are distributed to the fleet for the information of the midshipmen and their instructors. A very elementary knowledge will suffice for the college examination, 151, 152. Failures after a certain time oblige an officer to retire from his profession, 153. Is not in favour of a rejecting admission examination; thinks it would tell very hardly upon the officers, 154-156. The officers on board ships that have no naval instructors can be taught by another officer, generally the navigating officer, and then he receives the tuition money; the requirements are not high, and the number seldom exceeds four. There

FANSHAWE, ADMIRAL—*cont.*

are but few ships with midshipmen without naval instructors, 157. The fact of their entering the college every month does not make it very difficult to arrange the classes for instruction efficiently, 158-161. When a professor has an assistant, the assistant takes part of the class, 162, 163. The half-pay officers join generally at the beginning of a session, but the lieutenants come and go, because when they are paid off from a ship they may wish to come to the college at once. It is not quite the same with the commanders and captains. The sub-lieutenants do not get any marks for chemistry, 164.

Irregularity in attendance of voluntary students, 2081-83. Manner in which it is dealt with, 2088, 89. Does not think any of them come to the college with a view of its being an agreeable place for a temporary residence, and retain that view, 2084, 85. Within the college has never heard it spoken of as a club, but outside he has, 2086-88. As to want of discipline, 2090-94. It has never been reported to him that sometimes the sub-lieutenants come to the lecture rooms having indulged to excess, to such an extent that they could not pursue their studies; the consequences of such a case being reported to him would be very serious, 2095-98. Dr. Hirst occasionally visits the lecture rooms; does not think it necessary that he should visit them more frequently, 2099, 2100. Considers the half-yearly examinations on board ships are of much value, 2101. Intermediate instruction of sub-lieutenants; difficult for them to retain their knowledge; test papers they have passed on coming to the college, 2102-5. Manner in which the results of the examinations afloat are communicated, 2106. Sub-lieutenants forget a great deal at sea, and pass from the college with a very elementary amount of knowledge, 2107, 8.

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Is assistant to Dr. Hirst, 1219. Time entirely taken up with examination; gives no instruction, 1220, 21. As a general rule, sets the questions and looks over the answers, 1222. Persons he examines; number of papers; subjects of "Britannia" final examination, 1223-50. Endeavours to vary the questions, 1251-54. "Britannia" and college papers; looks upon the "Britannia" examination as far easier than the college, 1255-64, 1327. The principle of putting nearly the same value on the questions, whether easy or difficult, was recognized to a certain limited extent, but sometimes one question would have double the marks allotted to it that another would, 1265, 66. Would be glad to have leisure for private reading and so on; would like a second permanent examiner to assist him, 1267, 68. All the papers set in the various examinations are submitted to Dr. Hirst, who frequently makes alterations, but does not, as a general rule, look over them; the tabulated results are also submitted to Dr. Hirst, who makes his report accordingly, 1269-76. Had been three years at sea as naval instructor before joining the college, and passed a similar examination to that now in force, 1277-80.

Thinks that a test examination for admission would hardly be practicable in the case of acting sub-lieutenants; different conditions under which they serve, 1282-85. Decidedly thinks that the sub-lieutenants have received adequate instruction in the college, and have been well trained, 1286. Sees very little indication of private cram, 1287, 88. Has known a good many cases in which sub-lieutenants have had private tutors, but they were mostly weaker officers; those who are in a position to take first or second class certificates do not think of having them, 1289-92, 1304-6. Has heard that the college authorities discourage private tuition, but cannot say positively, 1303. Does not think that so many resorting to it is any proof that the instructors are not efficient or careful; under any system some would resort to it, 1312-14, 1317. They get individual instruction to a certain extent, 1315, 16. There is no separation of those who get on faster than others; they are taught together, 1320-23.

If those sub-lieutenants who know a fair amount, and who remember their algebra and trigonometry well, were to be placed in a higher class and undergo a higher order of instruction, they would not be able to follow the course up, 1293-96.

Instruction of midshipmen on board small ships, 1297, 98. If they could keep up the course they went through in the "Britannia," would hardly be justified in saying that he thinks the result in the final examination would be very different, 1299. Even in the largest and most

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commodious ships, the study is conducted under difficulties, which render any real progress almost impossible, 1300. Example of the usual amount of study in ships carrying naval instructors, 1301, 2. No sub-lieutenant can obtain a second or first class certificate unless he obtains a certain proportion of marks in each of the mathematical subjects, 1328. Never heard that proper discipline is not maintained in the studies or lecture rooms frequented by sub-lieutenants; never heard of any unusual amount of noise, 1330-32. Appointment of assistants for particular examinations, 1333-35. The "Britannia" examination in Latin, 1353-40. Sets some of the papers for the dockyard schools, and looks over them when his time permits, 1344, 45. Statement of the different examinations in 1875, showing the number of papers prepared by him, and also the number that he marked, 1346.

HIRST, DR. T. ARCHER, F.R.S., DIRECTOR OF STUDIES - - - - - p. 9

Has the arrangement of the whole studies of the college, and also the direction of the internal and external examinations; but gives no instruction, beyond filling a gap occasionally, 166-168. Is aware of the questions to be inquired into, 169. Generally divides the students into two classes,—the voluntary students, and those who are following prescribed courses of study, 170. The course of the naval architects occupies three years, 171; and the complete course of the marine engineers, including the English and foreign officers for voluntary study, is also for three years; two of the students of marine engineering are selected every year to undergo two more years' instruction, in addition to the one already received, 172. All engineer students in our dockyards, after an education of six years there, pass one session in the college, unless they fail to pass the final dockyard examination, 174, 175, 179; from them two are selected to remain a second, and afterwards a third session, three sessions being the complete course necessary to obtain a professional certificate, 179. It is not so with the shipwright apprentices, for whom there is a competitive examination, and only three come yearly, these being chosen from all the dockyards; the selected three come for three sessions, 175, 179, 193. A shipwright is apprenticed, engineer students are not properly speaking apprenticed; they ultimately belong to the navy, and may gradually rise to be chief engineers; the shipwrights never belong to the navy, 176. An engineer student begins his course in a dockyard, but does not go regularly to sea until after he has been at the college, 177, 178. Exclusive of English and foreign private students, there are always fifteen going through a three years' course of study, 180, 181. The first-year students all study together; the second and third years' men study in the same room, although they constitute different divisions of the class; the first year's men constitute two divisions of a lower class, each division occupying a separate room, 182-184. There is no two years' course either in marine engineering or in naval architecture, 185. About 40 were going through the one year's course, 186. The number of first, second, and third year's men is always equal, 187. The number of those who come up for one year only, varies, 188; they are always more numerous than those in the second and third year's course, 189. The selection made depends upon the examination passed at the end of their first session, 190. The number in the first year's course is perhaps slightly under 40, 191; that in the second very much smaller, 192. The naval architects are selected for the three years' course, and the second year's men are only those naval architects who have emerged from the first year's course, 193. The shipwright apprentices represent the highest intellect of the constructing department of the navy; the three selected are the cleverest of their year in all the dockyards, 194. Those who are not successful in the competition for entry to the college either find employment in the dockyards or in private yards, 195.

It may be said that there is a rejecting examination for admission for those who are going through the course as shipwright apprentices or as engineer students, 196. The shipwrights come in by competition, for the others there is a test examination, 197, 198; and a selecting examination for those who are to remain more than one session, 15 in number, besides the private students, 198, 199. Decidedly thinks that the staff of instructors for those students who stay for either one or three sessions is adequate and properly arranged, 200-206. Made the arrangements in conjunction with Admiral Sir Cooper

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Key and with the individual instructors in the more technical subjects, 207. If there were in his first year a very good and advanced mathematician, he would not be instructed with those of the third year, but be kept with the first year's men, who are in two divisions, 208, 210. The volunteer engineers are usually taken into the second division of the class, 209. This class includes the foreigners, 210. As regards the *élite* class in respect of advanced education in the college, thinks that the staff is sufficient, and that no further assistance is required, 211. As regards the second class, that of acting sub-lieutenants and acting navigating sub-lieutenants, thinks that at the present moment there is adequate means provided for their instruction; a year ago their numbers rose to more than 100, but they have now diminished to 53; if the number increased to 80, should be very glad to see our mathematical staff a little supplemented, 212-215. Looks upon 25 as the maximum number that an instructor can well teach; is not speaking of lecturing or black-board work; as there are three instructors, the present staff would suffice up to 75,—215, 219, 220, 371. Mathematics requires more individual attention on the part of the instructor than any other subject, 216. Difficulties which present themselves should be overcome at the moment, 217, 218.

The subjects in which the acting sub-lieutenants are to be examined contain very little more than what they did when they passed out of the "Britannia," 221. The papers that are set to the acting sub-lieutenants are only a little more difficult in the way of riders than those for the final examination for the cadets on board the "Britannia" in 1874, 222. The present examination is nearly as simple as the final examination on board the "Britannia" in 1873, 223-227. The "Britannia" examination is simpler now, 228. The college examination for acting sub-lieutenants is very little more difficult than the "Britannia" final examination in 1873, 229-231. The course of instruction is sufficient, if the students do not exceed 75, 231.

Some of the acting sub-lieutenants have private tuition, for which they themselves pay; this tuition is sought chiefly by those who have neglected their studies during the first two or three months; it would otherwise not be necessary, 232-234. Does not know the private tutors individually; thinks they do not receive aid from the actual instructors in the college, 235, 236. If the method of instruction at the college were as perfect as possible, and the staff perfectly adequate, many men would consider a private tutor whom they paid of more service than one provided for them, 237. The employing private tutors is to be discouraged, 238. A diligent and prudent student will find in the college all that is necessary to pass the final examination, 239. Explains the opportunities for gaining information from the instructor, independently of the actual lectures, 240-246. Can scarcely consider the means of instruction for the probationary lieutenants of the Royal Marine Artillery, eight or ten in number, to be adequate; would like to see a slight increase of staff; Captain Needham, who has charge of their military history, surveying, and fortification, as well as the instruction of other officers in these subjects, has no assistance whatever, 247, 369, 370; thinks he wants assistance, 252, 368. These students are non-voluntary, and stay at the college for two years; they pass the same examination on entry as those who pass into the Military Academy at Woolwich; the examination is conducted by the Civil Service Commissioners, and eight or ten of the successful candidates come to the college, 248, 249. Believes that in future all may remain, if at the end of their first session they pass an examination satisfactorily; does not yet know what will happen should they fail to pass; they greatly increase the work at the college, 249, 250. In their first session special provisions have to be made for them, in their second session they give no extra trouble, 251. The gunnery lieutenants are of a very much higher class; the gunnery course is compulsory, and is for the navy only; these officers constitute our highest class of obligatory students; they are picked men; after going to sea for one year specially, they come for one session only, 253-256, 260. There are 18 of them, 259, 364. Describes their course of study, 257-259, 365. Every lieutenant is not bound to come for gunnery instruction, 261. It is at their own option that they come,—upon their own application, 262, 263. They are called gunnery lieutenants for shortness, 264. Considers that the staff of instructors is adequate and properly arranged for them, with the exception of Captain Needham, 265. In the

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third class, consisting of those who come for voluntary study, in the course of 1875 there were as many as 117 altogether, 266, 267. That number having diminished considerably, the staff of instructors is sufficient, with one or two slight exceptions, 268-270. They all study mathematics for nearly three hours every morning; there are two classes, a higher and a lower, 270-272. Considers the staff of instructors in mathematics to be sufficient, 270, 272. Mathematics is the only obligatory subject of study for voluntary students; they are expected to take up at least two other subjects, which are optional; on the whole the instruction is adequate in all the subjects they may select, 272, 273. Some are very backward in mathematics, having forgotten what they learnt in the "Britannia," 274, 275. They have quite enough instruction at the college; they need not have recourse to private tutors, 276. Most of them are anxious to obtain as much information as they can, 277. They are sent away if inattentive, 278, 279.

Introduces the subject of marine surveying, which is taught on the "Arrow"; in connexion with marine surveying there is a certain amount of astronomical work, in which many officers would be very glad to receive instruction; there is at the college a small observatory, fairly well provided with instruments, recently put into practical working order; it would be of great utility to many naval officers to be able to take observations with such fixed instruments, also of professional value to them; there is no one to give instruction in the use of such instruments; the present instructor in marine surveying, Captain Johnson, does not profess to have a knowledge of fixed instruments such as are met with in observatories, 279-281, 288. An instructor is wanted; thinks he might also render occasional assistance to Captain Johnson, 282; his mathematical acquirements need not be of a very high order, 286, 287. If the Astronomer Royal could find room for them, our officers might obtain at the Royal Observatory, which is not far from the college, the knowledge they seek, 283, 284. Certainly thinks that everything necessary could be provided in the college observatory, 285; which is not at present made any use of, 289, 291. When Greenwich Hospital School was a higher school of navigation than it is now, the observatory was very much used by the pupils of the school, but the school has been reduced in its range of studies, and the observatory, being no longer required for its original purpose, was handed over to the college, 293, 294. A person experienced in the use of the instruments, and also able to teach others how to use them, is what is wanted, 295, 296.

Arranges the special lectures from time to time, which are sometimes given by our own professors and instructors, and sometimes by competent authorities outside the college, 297, 298. Some of these lectures cost nothing, others are paid for by special fees, 299-317, 319, 329, 330. Not compulsory on all the students, 318. Thinks it better that the special subjects should not be provided for as part of the regular course, but as opportunities arise, without having officers on the staff to give the lectures; prefers to call in those whom he thinks the most competent, or to invite his own officers outside the usual programme to give a somewhat more general exposition, 320-322, 329. These lectures as much under his control as the general arrangements of the lectures of the college, 323. Might occasionally like to have lectures on geology, natural history, and botany, and hygiene, but have had no room for them, 324, 325. Those lectures are open to all the voluntary students, but not necessarily to others; they are attended by a very large number, not only of students, but officers in town, and are generally delivered from 12 to 1, never after 5 o'clock, 326-328. Notices of them are sent to the naval clubs, 329. The course was drawn up by himself, 331. Thinks that, occasionally, additional remuneration ought to be made to the officers of the staff for occasional lectures; at present no such means provided, 332-336.

Sees no reason, with our yearly examinations afloat, for having an examination of acting sub-lieutenants on entry, 338, 339. If all the 12 examinations of an acting sub-lieutenant in the six years at sea were unsatisfactory, he would have to enter the college as a matter of course, 340. The difficulty in passing after six months' study at the college has been greatly exaggerated; you may count on your fingers those that have failed from lack of ability, 341. The students live in the college; they are under discipline, but have a good deal of liberty, 342-344. Does not think it indis-

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pensable that there should be a rejecting entrance examination, 345. The sum total of marks is 1,500; 1,250 puts a man in the first class, which is a mark of real distinction; very few take a first class, 347-349. There are three classes, depending on the number of marks, 350, 351. The custom of assigning the same value to all questions, easy or difficult, never existed in his time; the values are now given according to the relative ease or difficulty of the questions, 352-354.

Specifies the number of students of naval architecture and of marine engineering, excluding acting sub-lieutenants, who were in 1875 going through a three years', a two years, and a one year's course, 47 in all, 355-359. These 47 students have two professors and two instructors for mathematics and applied mechanics, who are sufficient; they have three hours' instruction daily, 360-363. The instruction of the gunnery lieutenants is all that is necessary, except in fortification, 366, 367. If the sub-lieutenants do not exceed 75, the present staff is sufficient; the voluntary students are also sufficiently well provided for; they were about 109 in number, 371, 372. Only 93 came up for examination, 373. The special courses of lectures are to supplement the ordinary instruction of the college on subjects which could not well be introduced in the ordinary courses of instruction, 374. Several of the lecturers are members of the ordinary staff of the college, and most of them have given the lectures without any fee; the attendance is greater than at the regular classes, 375. The lectures originate in various ways; he recommends to the President their being given, who directs that they shall be given, 376-378. Thinks that the system upon which the gentlemen on the staff deliver these lectures is satisfactory, 379. The line of separation between a remunerated and an unremunerated lecture cannot well be defined; if an instructor had to depart from the precise line of instruction he has undertaken, a claim for additional remuneration might fairly be entertained; he would report that claim to the President, 380-382. Has not found any practical difficulty in deciding whether a lecture should be remunerated or not, 383. Most of the lectures are unremunerated, 384. Goes through the list and points out those which have been remunerated, explaining the position of some of the lecturers, 384-407. Does not think it desirable that any particular course should be repeated session after session, 399. Should rather be printed in a book 400.

For the college examinations in June the questions are set and the answers reported upon by persons not on the college staff, 408. Gives particulars as to the examiners and the subjects at the last examination, 409-416. The examinations in special courses of lectures are sometimes exceptionally treated; occasional lecturers are often asked to set the examination papers in the subjects of their lectures; if a fee be given, it includes both lectures and examination paper, 417-422. The lectures on meteorology and nautical astronomy must be attended by the sub-lieutenants, and students of marine engineering and naval architecture are directed to attend certain other occasional lectures, 423, 425. The examination papers on the special lectures follow the nature of the lecture itself as to being compulsory or voluntary, 424. Mr. Goodwin examines the sub-lieutenants in meteorology, as well as in navigation and nautical astronomy; he is on the staff, but gives no instruction, 426, 427. Those who are passing an examination after an obligatory course of study at Greenwich are never examined by any one who has taken part in their instruction; in the case of the occasional lectures, the lecturer is, by way of exception, the examiner, 427. The lecturer sometimes both sets the paper and looks over it, 428. Not more than 200 marks are given for the subjects of special lectures, 429. With respect to the final examinations, the passing or rejecting of individuals is done by outside examiners, 430, 431. Where Admiralty officers are employed to conduct the examination, it is upon subjects in which it would be exceedingly difficult to find the same knowledge outside the officers of the Admiralty, 432.

His work has been rendered very heavy indeed by these extra college examinations. Every examination paper set for the students of the college, as well as for candidates outside, must go through his hands, 433-435, 444, 445. The students examined are always indicated by numbers, 436. His work also extends to the dockyard schools, 437, 438. He is ultimately responsible for the examination papers of the young gentlemen examined at sea twice a year, 439, 440. His

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responsibility extends to the "Britannia" examinations, 441, 442, 444. Has occasional assistance besides that rendered by Mr. Goodwin; proposes to recommend that, instead of this occasional assistance, an additional examiner should be appointed, 443, 447, 448, 462, 574, 582. Arranges the proportion of marks allotted to the different subjects, subject to approval of the President and the Admiralty, 446. Number of papers in examinations, 449, 450. Mr. Goodwin looks over these papers, with assistance, 451. The assistant examiners usually receive a fee for the whole work they do, 452. Would like to delegate a portion of the examinations to the Civil Service Commissioners; they could not relieve him to any great extent, but they might to some, 453-459. Examining and looking over papers is dreadfully trying and tiring work, 460, 461. The instructors could not partake in the "Britannia" examinations, but three are able to give important assistance in the dockyard examinations of July; for those of January the same provision cannot be made, 462, 463. The July examination at the dockyards is of extreme importance, 464. Always goes to the "Britannia" twice a year; besides supervising the result of the examination at the college, usually examines on board the "Britannia," *visd voce*, the cadets who are passing out, 465, 466. Visits the dockyard schools once a year at least, some twice; thinks they ought all to be inspected twice a year; generally gives a *visd voce* examination, 467-469. Generally passes two or three days on the "Britannia," and one day at each dockyard school, 470, 471. Finds it an addition to his other labours, though not disagreeable, 472. Makes observations on the extent of his duties; failing health warns him that he must attempt less; asks to be relieved of all details connected with outside examinations; the responsibilities from which he desires to be relieved, Mr. Goodwin is in every sense qualified to assume, but will require permanent assistance, 473-476. The cost of examining for the "Britannia," and also for the dockyard schools, falls, in one sense, upon the staff of Greenwich College, 477, 478. Will be glad to put on paper any specific propositions that he desires to have considered for the relief of his own branch, 479. As to Mr. Goodwin being paid out of college funds, 475-477, 479. His appointment was simply as Director of Studies in the college, 480. Has always been of opinion that the education generally should be under one head, 482.

How the examination of the acting sub-lieutenants is conducted; number of examinations, 483-488, 491. Cramming, 489, 490. The "Final Examination," 492; it excludes the acting sub-lieutenants, 493. Re-examination of lieutenant who has failed, 494. Aggregate marks required to pass, 495-500. Examination conducted by those who have not had any share in the instruction of the candidates examined, 501. Very little difference between these examination papers and those set in the "Britannia" in 1873, 502. With the system of examination at sea twice a year, subjects not likely to be forgotten to a great extent, 505. Mode in which he secures that the examiners shall be independent of instruction, 506, 507. With regard to the general rate of payment of the professors and instructors, thinks that an augmentation of the salaries may be looked for in due time, 508. Draws attention to an anomaly in the position of Mr. Lambert, and to one or two insufficiencies in payment; relative position of Professors Miller and Lambert; their salaries; time occupied by their college duties, 508-528, 551. Duties of the professor of physics, also of his assistant and of his demonstrator; their salaries, 529-538. Professor Cotterill, professor of applied mechanics; eminence of, 539-543. Very willing to support any well-matured proposition to give gradually increasing salaries to the professors, 525, 544, 548-550. Scarcely thinks that the circumstance of Greenwich being so near London makes those positions more valuable, 545-547. Thinks it very desirable that first-rate men should be retained, 550. Observations on the title and salary of Professor Lambert, and on the salaries of certain instructors and demonstrators, 551-557, 560, 561, 582. Would not object to the assistants increasing their incomes by lecturing of an evening, 558, 559.

Services rendered by Mr. Canter, engineer in charge of the "Arrow" and assistant to the instructor in steam at the college; recommends addition of 50*l.* a year to his full pay, 560, 561. Instruction in French; terms of Professor Cassal's agreement; adequacy of instruction at present, the number of sub-lieutenants having much diminished, 562-568. Instruction in German and Spanish also sufficient, 567. The scale of payment

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LIEUTENANT B., R.N. - - - - - p. 72

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READ, THOMAS CROAD, Esq. - - - - - p. 67

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INDIVIDUAL INSTRUCTION. See INSTRUCTION.

INSTRUCTION.

Consent with the course of, and its details. *Fairlie*, 130. No deficiency of for those who attend for those reasons, and for two reasons, *ib.*, 131-36-37. For *Hurst* takes a prominent part in supervision of *ib.* 13. Instruction of sub-lieutenants, *ib.*, 131-132. *Hurst* thinks that students have sufficient instruction, *ib.*, 131. If the method of instruction were as perfect as possible, many more would consider a private tutor whom they paid of more service than was provided for them. *Hurst*, 224. Seriously considers the means of instruction for the professional lieutenants of the Royal Marine Artillery to be adequate. Captain Newbould, who has charge of their military history, surveying, and gunnery, as well as of the instruction of other officers in these subjects, wants assistance, *ib.*, 247, 248, 250, 259-71. Instruction for voluntary students is adequate, *ib.*, 272-273. Instruction for naval architects, marine engineers, and gunnery lieutenants, *ib.*, 369-372, 374, 377. Prompt assistance rendered to students, *Long*, 100, 143-144, 145-174. Feels the want of further instruction in the college, *Acting Sub-Lieut. A.*, 169-71. Numbers in his classes; not sufficient instruction, *ib.*, 171-74, 175-24, 175-31, 175-33. Has often regretted the want of, on board the ships he has been in, *ib.*, 175-41. Might be better at the college; individual assistance, *ib.*, 175-77, 175-82, 175-85, 175-176. Seriously thinks that the college instruction for the sub-lieutenants has been adequate, *Gordon*, 1204. Instruction of midshipmen on board small ships, *ib.*, 1257, 30. If they could keep up the course they went through in the "Britannia," would hardly be justified in saying that he thinks the result in the final examination would be very different, *ib.*, 1259. The acting sub-lieutenants get individual instruction to a certain extent, *ib.*, 1259, 15. Give every assistance, *Cornwall*, 1339-41, 1343. Opinion of the college scheme, *ib.*, 1372-74. Suggests a line and one for mathematics as lieutenant, *ib.*, 1375-76. What the college sheet includes, *ib.*, 1384. Suggests subjects of study, in a three months' course, for a cadet coming out of the "Britannia" in the third class, and who is to turn for mathematics, *ib.*, 1391-95, 1396; at the end of that time, if they were fit for it, would require they should go on, *ib.*, 1411-7, 1412, 12. Where an officer has greater aptitude for mathematics, thinks the college course will make him a better officer, *ib.*, 1396. Case of two cadets who passed well in mathematics, and who went to sea with him in the "Reynier"; instruction they had on board, *ib.*, 1391-97. Every officer who went into the navy ought to have a thoroughly good grounding in elementary mathematics, *ib.*, 1400. A man may have other very valuable qualities for a naval career without being a mathematician, *ib.*, 1405, 4, 1439-42. Would not turn the whole instruction to completely upon mathematics, but considers it desirable that the navy should have a certain number of first-rate mathematicians, *ib.*, 1407-10, 1463. There is nothing to be desired in the way of instruction as regards the voluntary students, *ib.*, 1431, 32. Without at least an elementary knowledge of mathematics, an officer would be cut off from reading and study almost necessary in many parts of his career, *ib.*, 1450. Professional disadvantages of officers with no taste or capacity for mathematics, *ib.*, 1461. College instruction sufficient for himself, but not for others, *Burney*, 1488-90. Thinks they were taught nothing superfluous, *ib.*, 1521-23. Very little instruction in small ships, *ib.*, 1578, 79. There ought to be an interval between leaving the "Excellent" and coming to college; time wasted in taking *Sights*, *ib.*, 1602, 3. Did not think there was sufficient assistance at the college, *Fairlie*, 1629. Difficulty in keeping up with the more advanced; mode of instruction, *ib.*, 1659-67. The college sheet, *ib.*, 1670-77. Has every assistance, *Steward*, 1695-98. Instruction sufficient, *ib.*, 1727-29. Hardly thinks the descriptive geometry is taught sufficiently well; assistance is required, and models, *ib.*, 1744, 1748-58, 1784, 85. Got all the assistance he wished, *Read*, 1803. Thinks they ought to be examined in descriptive geometry; what is meant by it; thinks there was sufficient individual assistance in learning it, *ib.*, 1811-14, 1833-40. Thinks it desirable that his class should go through so high a course of mathematics, *ib.*, 1827. Had sufficient assistance in Professor Cotterill's class, *ib.*, 1848-50. Individual instruction; more time wanted, *Chevalier*, 1873, 1878-82. Gets all the assistance he wants, *Lieut. A.*, 1947, 1950, 51. The instruction is good enough, and quite sufficient, *ib.*, 1965, 66. Gets all the individual assistance that he can reasonably expect, *Lieut. B.*, 2016. Thinks the voluntary students are generally satisfied with the instruction, but

INSTRUCTORS—ONE.

There is a feeling that first-rate practical training is not given by the "Britannia." *Quinn*, 200. **SPECIAL LECTURES. NAVAL INSTRUCTION. OBSERVATORY. PRIVATE INSTRUCTION. SPECIAL LECTURES. TEAM STUDY. TUTORIAL ASSISTANCE.**

INSTRUCTORS.

Staff generally sufficient; in those less circumstances a professor, it is necessary there should be a staff; sometimes it is less deficient. *Fairlie*, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

KARCHER, M. See EXAMINERS.

KNOWLEDGE OF STUDENTS ON ADMISSION.
See STUDENTS.

LECTURES:

Not desirable that any particular course should be repeated session after session. *Hurst*, 389, 400. Refer to the lectures on engine design; it is very difficult to keep up with them; time too limited. *Steward*, 1706-10, 1741-43, 1748, 1775-82. What notice is taken of irregularity at, *Lieut. B.*, 2015-23. See also SPECIAL LECTURES.

MARINE SURVEYING. See OBSERVATORY.

MARKS:

Sum total of; number for first class, *Hurst*, 347-349. Three classes, depending on number of, *ib.*, 350, 351. Not more than 200 given for subjects of special lectures, *ib.*, 429. Arranges the proportion of, for different subjects, *ib.*, 446. Aggregate number required for sub-lieutenant to pass, *ib.*, 495-500. Gives merit marks, *Lambert*, 699-702. Number required for a third class, *Fairlie*, 1606. See also FAILURES.

MATHEMATICS. See INSTRUCTION.

METEOROLOGY. See SPECIAL LECTURES.

MIDSHIPMEN. See INSTRUCTION.

MILLER, PROFESSOR. See PROFESSORS.

NAUTICAL ASTRONOMY. See SPECIAL LECTURES.

NAVAL INSTRUCTORS:

Not necessarily able to teach use of observatory instruments, *Fanshawe*, 97, 98. Names of, *ib.*, 106, 107. Every officer afloat has to pass two examinations a year, whether he has a naval instructor or not, *ib.*, 133. But few ships with midshipmen that are without, *ib.*, 157. Recommends retention of naval instructor, with addition to pay as deputy examiner, *Hirst*, 584, 585. Object of appointing them, *ib.*, 586. Ships that carry, *Laughton*, 892. None on any of the ships in which he served, *Acting Sub-Lieut. A.*, 1045. Had one most of his time, *Acting Sub-Lieut. B.*, 1147-49. Even in the largest and most commodious ships, the study is conducted under difficulties, which render any real progress almost impossible, *Goodwin*, 1300. Example of the usual amount of study in ships carrying, *ib.*, 1301, 2. Has no doubt whatever you could not do without, *Curme*, 1380. All those he has known have been efficient men, *ib.*, 1423, 24. Was all his time with one, *Burney*, 1476. Naval instructor in two ships, but not in others, *Fairie*, 1613, 14, 1651, 52. Had one in every ship but the last, *Lieut. A.*, 1975, 1980. Had one part of the time, *Lieut. B.*, 2009. As to naval instructors on board ships holding examinations, *Oborn*, 2057-61. Case of one who wished to exchange, *Fanshawe*, 2090-94. See also SUB-LIEUTENANTS.

NAVY. See EXAMINATIONS. FAILURES. INSTRUCTION.

NEDHAM, CAPTAIN. See INSTRUCTION.

NOISE:

Generally so much in the room in which algebra and Euclid are studied, through proper order not being kept, that it is difficult to learn much, *Acting Sub-Lieut. B.*, 1191-94, 1204, 5. Never heard of any unusual amount of noise, *Goodwin*, 1331, 32. There was no noise except on rare occasions, *Burney*, 1511. Thinks they were always quiet in the room, *Fairie*, 1635-37. The sub-lieutenants are more inclined to be noisy than the voluntary students, *Lieut. A.*, 1990-93. Has heard about there being so much noise, *Oborn*, 2064. See also DISCIPLINE.

OBSERVATORY:

Small one at college; some one wanted to teach use of; Dr. Hirst's proposal, *Fanshawe*, 96. The three instructors in nautical astronomy and navigation not qualified to teach use of stationary instruments; officers who take up surveying should be able, in a foreign country where there is an observatory, to know something about it, *ib.*, 97, 98. As in connexion with marine surveying, which is taught on the "Arrow," there is a certain amount of astronomical work, in which many officers would be glad to receive instruction, proposes to utilize college observatory, *Hirst*, 279-296.

OCCASIONAL LECTURES. See SPECIAL LECTURES.

OFFICERS AFLOAT:

Have to pass two examinations a year, *Fanshawe*, 133.

PAY. See FEES. PHYSICS. REMUNERATION. SALARIES. SPECIAL LECTURES.

PHYSICS:

Nearly all the officers in the different divisions examined in, *Fanshawe*, 107. Assistant in, has charge of instruction of sub-lieutenants, *ib.*, 121, 122. Attendance of the Professor of, and his assistants, *ib.*, 123-131; their duties and salaries, *Hirst*, 529-538. Thinks there should be some voluntary lectures in, *Burney*, 1534-37, 1562, 63.

PRIVATE TUITION:

The instructors or assistants do not give any; only sub-lieutenants have it, *Fanshawe*, 115. Backward students can obtain it in the neighbourhood, by paying for it; many sub-lieutenants do; great advantage to the navy for a man who is ignorant to obtain it, *ib.*, 147, 148. Thinks it absolutely necessary for one of mediocre abilities, and who is very backward, *ib.*, 149. Is aware that it is very frequently resorted to, but is not aware of the exact extent, *ib.*, 2077, 78. Does not think it necessary to inquire particularly into it, *ib.*, 2078. Thinks it could not be prevented, *ib.*, 2079, 80. Some of the acting sub-lieutenants have it; only necessary for those who have neglected their studies, *Hirst*, 232-234. Is to be discouraged, *ib.*, 238, 239. Unnecessary, *ib.*, 276. Strongly against; himself gives the students private help; they can also get it from his assistant, *Lambert*, 609-612, 647-649. Thinks that no Cambridge men go to Greenwich with the view of giving,

PRIVATE TUITION—cont.

ib., 653. Believes that none of the college lecturers take private pupils, but cannot say for certain, *ib.*, 654, 655. Students in his room do not have; in other rooms believes they do, *Laughton*, 876. Many have it; dislikes it, and discourages it in every way; it hampers him very much, and is not wanted, *Oborn*, 1021-28, 2038, 39. Extent to which men resort to it, *ib.*, 2040, 41. Some of the good men have resorted to it, but not many, he thinks, *ib.*, 2042-46. Gets assistance from a private tutor; what he pays for it, *Acting Sub-Lieut. A.*, 1078-86. Impossible, with the knowledge he came up with, to succeed without it, *ib.*, 1112. Thinks that most of the acting sub-lieutenants get it, *ib.*, 1087-91. Does not think he should want any, if he came up knowing more, *ib.*, 1092. Has never had a private tutor, and does not intend to have one; about half the sub-lieutenants do, *Acting Sub-Lieut. B.*, 1171-78. Many have it to make up time wasted, *ib.*, 1184. The more idle men generally employ private tutors, *ib.*, 1201, 2. If an officer had to provide himself with, it would be felt as a serious addition to the expense of the college, *ib.*, 1206. Sees very little indication of private cram, *Goodwin*, 1287, 88. Has known a good many cases in which sub-lieutenants have had private tutors, but they were mostly weaker officers; those who are in a position to take first or second class certificates do not think of having them, *ib.*, 1289-92, 1304-6. Has heard that the college authorities discourage it, but cannot say positively, *ib.*, 1303. Does not think that so many resorting to it is any proof that the instructors are not efficient or careful; under any system some would resort to it, *ib.*, 1312-14, 1317. Never heard of any of the voluntary students having it; he wanted no outside assistance, *Curme*, 1367, 68. Knows as a fact that the sub-lieutenants were working with private tutors outside, *ib.*, 1415, 18. Many had private tutors; he had two, *Burney*, 1498-1505, 1534, 35, 1538, 1541, 42, 1546-48, 1566. Thought it better to take a private tutor; thinks he would not have passed without, 1624, 48. His class do not resort to private tutors, *Steward*, 1703-5. Never required a private tutor; never heard of any of his class of students having any, *Read*, 1805-7, 1841. Thinks none in his class have a private tutor, *Chevallier*, 1889, 90. Has no private tutor, *Lieut. A.*, 1948. Thinks none of the voluntary students have any, *ib.*, 1989.

PROBATIONARY LIEUTENANTS OF ROYAL MARINE ARTILLERY:

Description of; they greatly increase the college work, *Hirst*, 248-251. See also INSTRUCTION.

PROFESSORS:

Tabulated statement of the work of the professors and instructors, with remarks, *Fanshawe*, 20, 21. Anomalous position of Professor Lambert as compared with Professor Miller, *ib.*, 22-25; *Hirst*, 508-528, 551. No marked difference between professor and instructor, *Fanshawe*, 108, 109; they do not give independent lectures in the same subjects, *ib.*, 110-113. Thinks it desirable for the students at Greenwich that there should be two professors of high mathematical attainments, *Lambert*, 672-686, 708-710. Thinks there should be some prospect of an increase in the salaries of, and of instructors, *ib.*, 711-723. Position of, *Laughton*, 942-947. See also CASSAL, PROFESSOR. COTTERILL, PROFESSOR. PHYSICS. SALARIES.

REJECTING EXAMINATION FOR ADMISSION:

Not at present in favour of, *Fanshawe*, 154-156. It may be said there is one for those going through the course as shipwright apprentices or as engineer students, *Hirst*, 193. Sees no reason for examination of acting sub-lieutenants on entry, *ib.*, 338, 339. Does not think it indispensable, *ib.*, 345. Thinks it would be unfair in the case of acting sub-lieutenants, *Oborn*, 975-980. Thinks it would hardly be practicable in the case of acting sub-lieutenants; different conditions under which they serve, *Goodwin*, 1282-85. Thinks it a good plan to examine the sub-lieutenants on entry, but practically it would be better to give a three months' trial to everybody. There is no reason why there should not be an entrance examination as well, *Curme*, 1438.

REMUNERATION:

Of examiner in French, *Fanshawe*, 107. Additional, should occasionally be made to officers of staff for special lectures, *Hirst*, 332-336, 379-407. If a fee be given it includes examination paper, *ib.*, 417-422. Comparison of emoluments of a college tutor and a professor at Greenwich, *Lambert*, 716-723. See also FEES. SALARIES. SPECIAL LECTURES.

ROYAL NAVAL COLLEGE:

Great object of, *Laughton*, 919, 920. Many officers leave, at the end of their course, with an unsatisfactory amount of knowledge, *ib.*, 938, 939. Not so popular as it was, *Lieut. A.*, 1939, 40, 1942, 43, 1968-71. Why voluntary students come, *ib.*, 1954-56. Too much surveillance by the college police, *ib.*, 1969-71. Does not think the reason why there are fewer voluntary students than last year is because the college is not liked, *Lieut. B.*, 2024-28. Falling off in numbers at, *Oborn*, 2070, 71. Does not think any of the voluntary students come with a view of the college being an agreeable place for a temporary residence, and retain that view, *Fanshawe*, 2084, 85. Within the college has never heard it spoken of as a club, but outside he has, *ib.*, 2086-88.

SALARIES:

Thinks that an augmentation of, may be looked for in due time, *Hirst*, 508. Difference in, of Professors Miller and Lambert, *Fanshawe*, 24, 25; *Hirst*, 508, 509, 551. Would support a well-matured proposition to give gradually increasing salaries to the professors, *ib.*, 525, 544, 548-550. Of certain instructors and demonstrators, *ib.*, 551, 561, 582. Thinks there should be some prospect of an increase in, for professors and instructors, *Lambert*, 711-715. Believes, speaking generally, that the table of, is satisfactory, *Laughton*, 941. See also CANTER, Mr. PHYSICS. REMUNERATION. SPECIAL LECTURES.

SPECIAL LECTURES:

Arranges; by whom delivered; some cost nothing, others paid for specially; not compulsory on all the students; thinks it better that special subjects should not be provided for as part of the regular course, *Hirst*, 297-336, 375, 379-407, 417-422. Are to supplement the ordinary instruction of the college, *ib.*, 374. They originate in various ways, *ib.*, 376-378. Examinations in, sometimes exceptionally treated, 417-422, 427, 428. Classes of students bound to attend those on meteorology and nautical astronomy, &c., *ib.*, 423, 425. Thinks there should be some voluntary lectures in physics, *Burney*, 1534-37, 1562, 63. See also EXAMINATION PAPERS. MARKS.

STAFF OF INSTRUCTORS. See INSTRUCTORS. REMUNERATION. SALARIES.

STEAM:

Advantage to a captain of a knowledge of, *Curme*, 1444, 1447-49. For all practical work connected with the engine, a man might very well do without knowing anything of mathematics, *ib.*, 1453.

STUDENTS:

Three classes of, *Fanshawe*, 77-87. Sufficient means of individual instruction, *ib.*, 141. Generally divides them into two classes, *Hirst*, 170. Description of various classes of, and their course of study, *ib.*, 171-199, 208-210, 248-251, 253-279, 364, 365. Instruction adequate for voluntary, *ib.*, 272, 273. Discipline of, *ib.*, 342-344. Number going through courses in 1875, *ib.*, 355-359. The students examined are always indicated by numbers, *ib.*, 436. Standard of knowledge on admission, *ib.*, 504, 505; *Lambert*, 624-628, 632, 638, 639; *Reinold*, 770-772, 779-784; *Laughton*, 853, 854, 860-862, 882-891, 985-891; *Oborn*, 954-957, 991, 1032, 2072-76; *Acting Sub-Lieut. A.*, 1065-68, 1125-27, 1138; *Acting Sub-Lieut. B.*, 1160-67, 1196-98; *Burney*, 1481-87; *Fairie*, 1638-40; *Chevallier*, 1883; *Lieut. A.*, 1931, 32; *Lieut. B.*, 2004, 7. If student not making progress, generally reports privately to the Director of Studies, *Reinold*, 816, 817. Time certain officers are at sea before entering the college, *Laughton*, 882-884. Difference there would be if students entered better prepared, *ib.*, 916-918, 922, 923. Thinks, altogether, those who have been in big ships show better groundwork than those who have passed much time in small ships, *Oborn*, 969-972, 978, 979, 986. The students are pretty regular in attendance, and generally industrious, *Lieut. A.*, 1936-38, 1941, 1994, 95. Dismissal of voluntary, *ib.*, 1944, 45. Why voluntary students come to the college, *ib.*, 1954-56. Thinks the voluntary students are industrious on the whole, *Lieut. B.*, 2017. Irregularity in attendance of voluntary students, *Fanshawe*, 2081-83. See also DISCIPLINE. EXAMINATIONS. INSTRUCTION. NOISE. PRIVATE TUITION. PROFESSORS. SUB-LIEUTENANTS.

STUDIES:

Arrangement of, *Hirst*, 166, 207. Change in course of, in "Britannia," *Oborn*, 958-966. As regards an officer extending his studies in the interval between the "Britannia" and the college, as things are is content with saying "keep up only," *ib.*, 973, 974. Time occupied in daily, *Acting Sub-Lieut. A.*, 1107-11, 1136, 37; *Acting Sub-Lieut. B.*, 1208-12. See also COURSE OF STUDY.

SUB-LIEUTENANTS:

Career in their profession depends upon their passing examination; three persons instruct them in the greater part of what they do, *Fanshawe*, 4; number in 1875, *ib.*, 5, 8. Six-monthly course, *ib.*, 89. Programme for acting; standard in each subject, *ib.*, 91-94. Failures, *ib.*, 95. Many have private tuition, *ib.*, 147. Instruction of, *ib.*, 121, 122. Does not think that the acting sub-lieutenants who have had a naval instructor at sea enter better prepared than those who have not, *ib.*, 132. Dr. Hirst's remarks on examination papers of acting sub-lieutenant at sea communicated to the fleet; extremely important they should be, *ib.*, 134, 135. Elementary amount of knowledge required for college examination, *ib.*, 150, 151. Get no marks for chemistry, *ib.*, 164. Subjects in which they are to be examined contain very little more than what they did when they passed out of the "Britannia," *Hirst*, 221. College examination very little more difficult than the "Britannia" final examination in 1874, *ib.*, 222-231. Some have private tuition; only necessary for those who have neglected their studies, 232-234. Sees no reason for examining them on entry, *ib.*, 338, 339. If all examinations at sea of, were unsatisfactory, would still have to enter college, *ib.*, 340. How their examination is conducted; number of examinations; cramming, *ib.*, 483-491. Aggregate marks required to pass, *ib.*, 495-500. Very little difference in papers set for, and those in "Britannia" in 1873, *ib.*, 502. Failure of certain, *Reinold*, 818-821; *Laughton*, 857, 858. Decidedly thinks that they have received adequate instruction in the college, *Goodwin*, 1286. If those who know a fair amount, and who remember their algebra and trigonometry well, were to be placed in a higher class, they would not be able to follow the course up, *ib.*, 1293-96. No sub-lieutenant can obtain a second or first class certificate unless he obtains a certain proportion of marks in each of the mathematical subjects, *ib.*, 1328. His impression was that they generally made the best use of their time, *Burney*, 1496, 97. Must take up all the subjects, *ib.*, 1583-87, 1589, 90. Thinks they are generally industrious, *Fairie*, 1631. System of instructing, *Oborn*, 2047-52. Intermediate instruction of; difficult for them to retain their knowledge; test papers they have passed on coming to the college, *Fanshawe*, 2102-5. They forget a great deal at sea, and pass from the college with a very elementary amount of knowledge, *ib.*, 2107, 8. See also DISCIPLINE. FAILURES. INSTRUCTION. NOISE. PRIVATE TUITION. REJECTING EXAMINATION. STUDENTS.

TEST EXAMINATIONS:

Has one weekly, *Lambert*, 698. At Christmas and Easter, *Reinold*, 808-811. From time to time, *Laughton*, 859.

TEXT-BOOKS:

How used; students make their own, *Lambert*, 660-662.

TUITION MONEY:

What it is, *Hirst*, 583.

TUTORIAL ASSISTANCE:

Sufficient; none except in class rooms; thinks it would be a distinct disadvantage if there were, *Lambert*, 650-652. Thinks there is sufficient for his class, *Laughton*, 581.

VALUE ASSIGNED TO QUESTIONS. See EXAMINATIONS.

VOLUNTARY STUDENTS. See INSTRUCTION. PRIVATE TUITION. ROYAL NAVAL COLLEGE. STUDENTS.

